NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

TECHNICAL REPORT

VOLUME II

COMPUTATIONS OF NON-REACTING AND REACTING VISCOUS BLUNT BODY FLOWS

By

C. P. Li

Applied Mechanics Department
Lockheed Electronics Company, Inc.

Prepared Under Contract NAS9-12200 By
Lockheed Electronics Company, Inc.
Houston Aerospace Systems Division

for

Computation and Analysis Division
National Aeronautics and Space Administration
Manned Spacecraft Center
Houston, Texas

February 1973

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

Applied Mechanics
Department 628-20
TR2007

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PART 2

COMPUTER PROGRAMS DOCUMENTATION

THIS FORM MUST BE COMPLETED BY TYPEWRITER

DATE RECEIVED

014	017 PROGRAM NO.	COMPUTER PROGRAM ABSTRACT	01 14 CATEGORY	01 16 SUB CATEGORY
	F258			

01 20 TITLE OF PROGRAM (62 CHARACTERS MAXIMUM)	01 72 SYMBOLIC NAME (9 CHARACTERS MAXIMUM)	PARENT PROGRAM		
VISCOUS REACTING & NON-REACTING BLUNT BODY PROGRAMS		02 14 CATEGORY	02 16 SITE	02 19 PROGRAM NO.

02 27 LANGUAGE NO. 1	02 32 LANGUAGE NO.2	02 37 KEY WORDS (8 MAXIMUM, SEPARATED BY COMMAS)
FOR V		Viscous, Chemically Reacting, Boundary-Layer, Viscous Shock Layer, Thin and Thick Shock, Curvilinear Coordinate, Blunt Body

WHOM TO CONTACT ABOUT THE PROGRAM

05 14 CONTACT	05 28 SITE	05 31 ORGN. CODE	05 39 PROJECT NO.	05 45 NASA CENTER
R. Plunkett	MSC	FD36	3782	

05 48 STATUS

- [ ] A. UNDER DEVELOPMENT
- [ ] B. OPERATIONAL
- [X] C. COMPLETED

05 49

- [ ] A. THIS PROGRAM IS NOT FOR SHARING
- [ ] B. LIMITED SHARING (SEE ABSTRACT)

DATES		05 58 REVISION CODE	TIME AND COST FOR DEVELOPMENT			
05 50 INITIATED	05 54 COMPLETED		05 59 MAN-MONTHS	05 64 MACHINE HOURS	05 69 COMPUTER TYPE	05 74 TOTAL COST (DOLLARS)
7/71	9/72	[X] A. REVISION [ ] B. CANCELLATION	15.0	300.0	1108	
			59 60 61 62 63	64 65 66 67 68		74 75 76 77 78 79 80

CARD NUMBER	COLUMN 14	ABSTRACT (ELITE MARGIN / PICA MARGIN)
06		The viscous blunt body programs can be used to de-
07		termine the flow field surrounding the nose of a
08		blunt body at supersonic speeds and arbitrary
09		altitude. The flow properties obtained are the
10		location of the shock, either thin or thick in
11		comparison to the nose radius, detailed profiles
12		across the shock layer and shock wave, and heat
13		transfer and skin friction coefficients at the body.
14		The uses of the results include the starting of a
15		supersonic flow field computation downstream of the
16		nose, the design of a heat protection system, the
17		calculation of electrons inside the shock layer, and
18		the correlation with experimental data of a high
19		enthalpy flow. Many options are available to the
20		users of these programs. The transport properties,
21		chemical reactions, body surface conditions, and
22		three orthogonal 2D coordinate systems can be chosen
23		for a specific problem. Four versions of the
24		program are discussed, depending upon the thin or
25		the thick shock, and the ideal, equilibrium or
26		finite-rate chemistry.
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RELATED DOCUMENTATION (66 CHARACTERS MAXIMUM, SEPARATE EACH REF. BY COMMAS)

42	

MSC Form 800 (Rev Aug 69) PREVIOUS EDITIONS ARE OBSOLETE NASA — MSC

1.0 INTRODUCTION

Four programs have been developed to perform the calculations of flow field in the nose region of a blunt body at arbitrary speed and altitude. These programs differ from each other in their ability to consider either thin shock or thick shock conditions and in the use of either ideal, equilibrium air or nonequilibrium air chemistry. No attempt has been made to incorporate all four programs into a single one, and to use option cards to choose the particular program for use. This effort would be quite time-consuming because in each of the four programs there exists a number of options, viz., the choice of three orthogonal coordinate systems, four different body surface conditions in temperature and catalycity, and simple or multicomponent transport properties. It is felt that in order to achieve better computational efficiency and lower computer storage requirement, different programs should be used for different purposes. For clarity of further discussion, these four programs are termed as

I. Non-reacting thin-shock code
II. Non-reacting thick-shock code
III. Reacting thin-shock code
IV. Reacting thick-shock code

These programs have been completely checked out and applied successfully to the flow field computations described in Part 1 of this report. This part of the report will concentrate on the use and restrictions of these programs. In general, accurate solutions can be obtained for a blunt body flow with or without finite-rate chemical reactions for an altitude less than 400 Kft and a speed less than 26 Kft/sec,

or for a free stream Reynolds number, Re_∞/R_N , larger than one. However, it should be mentioned that since the computer execution time for Programs III and IV is very high, in the range of 3 - 10 hours on a UNIVAC 1108, present experience with these programs is gained from several selective cases.

2.0 PROGRAM DESCRIPTION

These programs are written primarily for solving Eqn (10) of Part 1 by means of a finite-difference method. The method of solution is described in Section 4, of Part 1. A description of the non-reacting thin and thick-shock codes is first given which is followed by the description of the reacting thin and thick-shock codes. The difference between the programs of thin and thick codes is indicated when it occurs.

MAIN subroutine is used to read in the parameters of the problem, i.e., the number of mesh points and time steps, the free stream conditions, etc. The subroutine BODY defines the body geometry which is presently limited to analytic equations. The initialization of the flow field computation is made in subroutine INIT. INIT is not called in the thick-shock code for which the necessary initial flow field is obtained in subroutine CONVR1, along with the conversion of physical flow properties into the vector $\overline{U}$ of Eqn (14) and (15). The metric coefficients of the coordinates used are determined in subroutine REGION. The time-marching forward procedure of Eqn (23) is programmed in subroutine DIFF. The boundary conditions as specified in equations in Section 2.4 are imposed to the computed results by subroutines SHOCK and WALL. The subroutine SHOCK is not used in the thick-shock code since the outer boundary has the free stream conditions. The constitutive equations defining the stress tensor and heat flux vector are coded in sub-routines STRESS and HEAT, respectively. Thermodynamic properties of the flow are obtained by calling the subroutine THERM. The input to THERM is obtained from subroutine

CONVR2, which converts the flow vector U to the physical properties. Finally, the subroutine OUTPUT prints out the results.

The program structure of the reacting thin and thick-shock codes is similar to that of non-reacting codes. Therefore, only the additional subroutines are given. These subroutines are needed to read information about the thermodynamic coefficients and transport properties of the mixture, and the chemical reactions. Subroutines INPUTT and INPUTR are responsible for this purpose. The initial flow field can be defined with a better accuracy in the reacting codes. Subroutines ANKINR, ACHEMP, ACHEM, MOLIER and PROPR are used to describe either an ideal gas initial flow field or an equilibrium flow field. Subroutine DIFF is responsible for marching-forward the solution as it does for non-reacting cases, except the vector U now has more than four components in order to consider the chemical species. A subroutine DIFFUS is added to account for the mass diffusion vector, which is not used in non-reacting codes. Transport coefficients are calculated in subroutine TRANSC, which calls either TRANSP for a multicomponent mixture or TRANSK for a simple mixture. Thermodynamic properties are calculated also in subroutines THERM and JANAF. The subroutine DISSS is used for the calculation of the net rate of production of species ω_1 in Eqn (5). Several other subroutines are used to perform the calculation of transport coefficients, they are subroutines GAUSS, GJR, LGRNE, SPLN1 and SPLN2. It should be mentioned that the reacting blunt body codes use the same name of subroutines, as in the non-reacting codes, for example, MAIN, INIT, OUTPUT, etc., but the content of these subroutines are not identical.

3.0 PROGRAM USAGE

3.1 Input Description

3.1.1 Data Specification and Definitions

NON-REACTING THIN OR THICK SHOCK CODE

Card	Format	Symbol	Content
1	12A6	ZA	Title of the problem
2	14I5	NRUN	Number of the run
		MONTH NDAY MYEAR	Date of the calculation
		LB	0 for planar flow, 1 for axisymmetric flow
		LE	1 for ellipsoid, 2 for paraboloid, 3 for hyperboloid (if LB = 1)
3	14I5	MA	Number of mesh spacings along the body
		NA	Number of mesh spacings across the shock layer or the computational region
		KA	Number of time steps to be executed
		JA	Number of time steps at which complete output is required
4	7E10.4	EPS(1)	0.001-0.0001 for the Newtonian iteration procedure used in SHOCK

Card	Format	Symbol	Content
5	7E10.4	RE	Free stream Reynolds number per foot
		PR	Free stream Prandtl number
		TW	Normalized body temperature <30
		BETA	Parameter for coordinate transformation
		RN	Nose Radius, ft
6	7E10.4	UO	Free stream speed, ft/sec
		PIN	Free stream pressure, lb/ft^2
		HIN	Free stream enthalpy, $(ft/sec)^2$
		GAMMA	Free stream ratio of specific heats
7	7E10.4	STAB	0.1-1 stability criterion for time increment
		ELL	Ratio of the major and minor axis of an ellipsoid
		ZO	Location of the origin relative to the origin of body coordinates
		YO	
		XIMAX	Location of downstream Line
		ANGLE	Half Angle of Conical Afterbody

Control cards are needed to delete ACHEMP for an equilibrium air calculation or to delete ACHEM for a perfect gas calculation.

REACTING THIN OR THICK SHOCK CODE

Card	Format	Symbol	Content
1	12A6	2A	Title of the problem
2	14I5	NRUN	Number of the run
		MONTH NDAY MYEAR	Date of the run
		LB	1 for axisymmetric flow 0 for planar flow
		LE	1 for ellipsoid 2 for paraboloid 3 for hyperboloid
		JC	Number of dependent variables 9 for five species 11 for seven species
3	14I5	MA	Number of mesh spacings along the body
		NA	Number of mesh spacings across the shock layer or the computational region
		KA	Number of time steps to be executed
		JA	Number of time steps at which complete output is required
4	7E10.4	EPS(1)	0.001-0.001 used in the Newtonian iteration procedure in SHOCK
5	7E10.4	RE	Free stream Reynolds number per foot
		Pr	Free stream Prandtl number

Card	Format	Symbol	Content
		LEWIS	Free stream Lewis number
		RN	Nose radius, ft
		TW	Normalized body temperature <30
		BETA	Parameter for coordinate transformation
6	7E10.4	UO	Free stream speed, ft/sec
		PIN	Free stream pressure, lbs/ft^2
		HIN	Free stream enthalpy $(ft/sec)^2$
		GAMMA	Free stream ratio of specific heats
7	7E10.4	STAB	Stability criterion for time increment
		ELL	Ratio of major and minor axis of ellipsoid
		ZO	Location of the coordinate system relative to the origin of body coordinates
		YO	
		XZMAX	Location of downstream line
		ANGLE	Half angle of conical afterbody

The following cards are used for calculation of transport properties

8	6(A6,6X)	DAT(1)	FROZEN for frozen calculation of transport properties BLANK for equilibrium calculation of transport properties
		DAT(2)	SIMPLE for simple transport coefficients BLANK for multicomponent transport coefficients

Card	Format	Symbol	Content
		DAT(3)	ISOTHE for isothermal wall BLANK for adiabatic wall
		DAT(4)	CATALY for fully-catalytic wall BLANK for non-catalytic wall
9	3F10.5	TLOW TMID THIGH	Defines two temperature intervals for the temperature coefficients
10	3A4,8X 3E10.4	NAM(1) NAM(2) NAM(3)	Name of the species
		WM	Molecular weight of the species
		FRAC	Free stream mass fraction of the species
		HOO	Molar enthalpy at 0°K
11-13	5E15.8	COEF (I,J,NS)	Temperature coefficients for two intervals, I=1,2. Each set has J=1, 7 coefficients and for species NS.
13+4 x(No. of Species -1)	5E15.8	COEF (I,J,NS)	Temperature coefficients for two intervals, I=1,2. Each set has J=1, 7 coefficients and for species NS.

Card	Format	Symbol	Content
13+4(No. of species) + (No. of Reactions)	5F5.0	STC(I,J)	Basic chemical reactions used in the equilibrium transport properties calculation

The following cards are used for calculation of chemical rate of production:

13+4(No. of species) + (No. of Reactions) +1	2I2	NSPEC NREACT	Number of species Number of chemical reactions
....+2	12A6	Z(I)	Title of the chemical reactions formulas
....+3 +NREACT	I1	ITYPE(I)	Type of reaction formula
	8X		
	E10.5	COEFA(I)	
	2F10.5	COEFB(I) ETA(I)	Rate constants
....+3 +NREACT +1 to ...+3+ NREACT7	6A6	PP(IDUM, JDUM)	The type of chemical reactions

In addition to the input through reading the cards outlined above, these programs have the capability of reading necessary parameters from a tape which contains the flow field results obtained from a previous computation.

3.1.2 Sample Test Data

Since there is no difference in the input data between the thin and thick shock codes, only the non-reacting and reacting input data are given separately.

Non-reacting thin or thick shock code

```
     IDEAL GAS BLUNT BODY FLOW AROUND A HYPERBOLOID--10 DEGREES
      0     6    22    72     1     3
     10   100   100    50
 0.0C01     0.01
 179282.5   0.71        6.          0.
 20000.     23.08       2520000.    1.4
 0.5        2.0         0.0         0.0         1.4         10.0
```

Reacting thin or thick shock code

```
 FINITE-RATE FLOWFIELD ABOUT A 2 FT SHPERE ON THE TRAJECTORY POINT NO 3
    9     6    12    72     1     1    11
   10    15   200    25
0.0001     0.01
14400.     0.71        1.5         10.         0.
25000.     0.04364     1980000.    1.4
0.7        1.0         0.0         0.0         1.0         10.0
FROZEN                      ISOTHE       CATALY
```

```
1000.      8000.      30000.
N                     14.008
   .62289649+00   .75996372-03  -.68415018-07   .26029019-11  -.34945540-16    2
   .58479554+05   .16852908+02   .25089713+01   .33558825-04  -.50810528-07    3
   .17437946-10  -.12061041-14   .56115633+05   .38176968+01                   4
NO                    30.008
   .40400914+01   .13988441-03  -.11091974-07   .42166881-12  -.56661273-17    2
   .98440496+04   .12764058+01   .35525990+01   .74104713-03  -.21044177-06    3
   .26615640-10  -.12202011-14   .96660986+04   .40007346+01                   4
N2                    28.016     0.767     -2072.3
   .40844968+01   .12278738-03  -.96239298-08   .36313722-12  -.48569485-17    2
  -.13953107+04  -.90243858+00   .32748564+01   .91440295-03  -.25532029-06    3
   .31771812-10  -.14403937-14  -.10722559+04   .40128936+01                   4
O                     16.0
   .38996390+01  -.36415106-03   .39166618-07  -.16293483-11   .23590944-16    2
   .25282127+05  -.53511900+01   .25834420+01  -.92229575-04   .29726886-07    3
  -.20210324-11   .10287797-16   .29209532+05   .46849012+01                   4
O2                    32.0       0.233     -2074.7
   .41112747+01   .13318230-03  -.94655609-08   .36033593-12  -.48453159-17    2
  -.10319605+04   .89757341+00   .37703377+01   .59954714-03  -.16830812-06    3
   .21487106-10  -.99140887-15  -.12872788+04   .27182910+01                   4
NO+                   30.008
   .40373003+01   .13743275-03  -.10814367-07   .40878651-12  -.54738251-17    2
   .11781023+06   .23637557+00   .32670481+01   .91953966-03  -.25578741-06    3
   .31790552-10  -.14399933-14   .11801990+06   .48541930+01                   4
E-                    .00052                -1481.254
   .25000000+01   .00000000      .00000000     .00000000      .00000000       2
  -.74537492+03  -.12427286+02   .25000000+01   .00000000      .00000000       3
   .00000000      .00000000     -.74537498+03  -.12427286+02                   4
LAST
```

O	O2		14	1	.0
1000.0000	8.7780	1.1690	1.1310		
1500.0000	8.0930	1.1750	1.1370		
2000.0000	7.6240	1.1790	1.1410		
2500.0000	7.2690	1.1820	1.1440		
3000.0000	6.9850	1.1850	1.1470		
3500.0000	6.7490	1.1880	1.1490		
4000.0000	6.5480	1.1900	1.1520		
4500.0000	6.3740	1.1920	1.1540		
5000.0000	6.2190	1.1940	1.1560		
6000.0000	5.9560	1.1970	1.1590		
7000.0000	5.7390	1.2000	1.1620		
8000.0000	5.5530	1.2020	1.1640		
9000.0000	5.3920	1.2050	1.1670		
10000.0000	5.2500	1.2070	1.1690		
N2	O		14	1	.0
1000.0000	10.6100	1.1970	1.1590		
1500.0000	9.6100	1.2050	1.1670		
2000.0000	8.9260	1.2110	1.1730		
2500.0000	8.4060	1.2150	1.1780		
3000.0000	7.9980	1.2190	1.1820		
3500.0000	7.6590	1.2230	1.1860		
4000.0000	7.3740	1.2260	1.1890		
4500.0000	7.1260	1.2290	1.1930		
5000.0000	6.8990	1.2310	1.1950		
6000.0000	6.5350	1.2360	1.2010		
7000.0000	6.2280	1.2400	1.2050		
8000.0000	5.9710	1.2440	1.2090		
9000.0000	5.7440	1.2470	1.2130		
10000.0000	5.5480	1.2500	1.2170		
N2	N2		20	1	2.0
200.0000	15.4310	1.0880	1.1050		
250.0000	14.4350	1.0870	1.0930		
300.0000	13.7780	1.0870	1.0870		
350.0000	13.3040	1.0890	1.0800		
400.0000	12.9450	1.0910	1.0830		
500.0000	12.4210	1.0950	1.0890		
700.0000	11.7670	1.1010	1.0950		
1000.0000	11.1700	1.1100	1.0960		
1500.0000	10.5400	1.1260	1.1070		
2000.0000	10.0100	1.1390	1.1150		
2500.0000	9.5200	1.1470	1.1200		
3000.0000	9.0710	1.1560	1.1250		
3500.0000	8.6970	1.1670	1.1300		
4000.0000	8.3500	1.1700	1.1330		
5000.0000	7.8040	1.1830	1.1420		
6000.0000	7.3940	1.1950	1.1470		
7000.0000	7.0350	1.2000	1.1520		
8000.0000	6.7210	1.2010	1.1550		
9000.0000	6.4740	1.2050	1.1580		
10000.0000	6.2790	1.2080	1.1580		
N2	O2		20	1	.0

200.0000	14.9790	1.0900	1.1200
250.0000	13.9180	1.0870	1.0990
300.0000	13.2150	1.0870	1.0910
350.0000	12.7160	1.0870	1.0870
400.0000	12.3370	1.0890	1.0800
500.0000	11.7980	1.0920	1.0860
600.0000	11.4210	1.0970	1.0900
800.0000	10.8500	1.1100	1.0990
1000.0000	10.4800	1.1320	1.1130
1500.0000	10.0500	1.1540	1.1280
2000.0000	9.8020	1.1710	1.1400
2500.0000	9.5980	1.1800	1.1510
3000.0000	9.4120	1.1930	1.1590
4000.0000	9.0800	1.2050	1.1690
5000.0000	8.7660	1.2120	1.1760
6000.0000	8.4840	1.2170	1.1800
7000.0000	8.2320	1.2210	1.1840
8000.0000	7.9910	1.2240	1.1880
9000.0000	7.7240	1.2270	1.1910
10000.0000	7.4880	1.2300	1.1940
02	02		20 1 2.0
200.0000	14.6460	1.0920	1.1420
250.0000	13.5130	1.0890	1.1090
300.0000	12.7630	1.0870	1.0960
350.0000	12.2310	1.0870	1.0900
400.0000	11.8340	1.0870	1.0870
500.0000	11.2710	1.0900	1.0820
600.0000	10.8840	1.0930	1.0870
800.0000	10.2900	1.1020	1.0930
1000.0000	9.8960	1.1150	1.0990
1500.0000	9.4700	1.1300	1.1090
2000.0000	9.2260	1.1470	1.1170
2500.0000	9.0200	1.1550	1.1240
3000.0000	8.8400	1.1620	1.1280
4000.0000	8.5160	1.1700	1.1340
5000.0000	8.2460	1.1760	1.1390
6000.0000	7.9630	1.1800	1.1430
7000.0000	7.7020	1.1840	1.1450
8000.0000	7.4790	1.1860	1.1470
9000.0000	7.2850	1.1880	1.1490
10000.0000	7.1140	1.1900	1.1510
N	N		14 1 .0
1000.0000	7.0390	1.1290	1.1440
1500.0000	6.2920	1.1340	1.1440
2000.0000	5.8120	1.1380	1.1440
2500.0000	5.4640	1.1420	1.1430
3000.0000	5.1930	1.1440	1.1430
3500.0000	4.9720	1.1470	1.1420
4000.0000	4.7860	1.1490	1.1410
4500.0000	4.6280	1.1510	1.1410
5000.0000	4.4880	1.1520	1.1410
6000.0000	4.2540	1.1550	1.1420
7000.0000	4.0620	1.1580	1.1410
8000.0000	3.9020	1.1600	1.1410
9000.0000	3.7640	1.1620	1.1410

10000.0000	3.6430	1.1630	1.1410			
N	NO		10	1		.0
1000.0000	9.4370	1.2040	1.1660			
1500.0000	8.5030	1.2120	1.1740			
2000.0000	7.8690	1.2180	1.1810			
2500.0000	7.3930	1.2230	1.1860			
3000.0000	7.0150	1.2270	1.1910			
4000.0000	6.4390	1.2340	1.1990			
5000.0000	6.0080	1.2400	1.2050			
6000.0000	5.6670	1.2450	1.2110			
7000.0000	5.3860	1.2490	1.2160			
8000.0000	5.1480	1.2530	1.2210			
N	N2		14	1		.0
1000.0000	9.8240	1.1960	1.1570			
1500.0000	8.8970	1.2030	1.1650			
2000.0000	8.2720	1.2090	1.1710			
2500.0000	7.8020	1.2140	1.1760			
3000.0000	7.4270	1.2180	1.1800			
3500.0000	7.1150	1.2210	1.1840			
4000.0000	6.8500	1.2240	1.1870			
4500.0000	6.6220	1.2270	1.1900			
5000.0000	6.4190	1.2290	1.1930			
6000.0000	6.0800	1.2340	1.1980			
7000.0000	5.7990	1.2380	1.2030			
8000.0000	5.5580	1.2410	1.2070			
9000.0000	5.3550	1.2450	1.2100			
10000.0000	5.1700	1.2470	1.2140			
N	O		14	1		.0
1000.0000	8.4180	1.1760	1.1920			
1500.0000	7.2270	1.1770	1.1840			
2000.0000	6.4940	1.1770	1.1780			
2500.0000	5.9840	1.1760	1.1580			
3000.0000	5.6060	1.1760	1.1380			
3500.0000	5.3100	1.1720	1.1270			
4000.0000	5.0750	1.1680	1.1260			
4500.0000	4.8990	1.1690	1.1280			
5000.0000	4.7450	1.1700	1.1290			
6000.0000	4.4900	1.1730	1.1290			
7000.0000	4.2820	1.1750	1.1330			
8000.0000	4.1080	1.1770	1.1340			
9000.0000	3.9590	1.1780	1.1350			
10000.0000	3.8290	1.1800	1.1370			
NO	NO		17	1		2.0
200.0000	15.1540	1.0950	1.1320			
250.0000	13.9740	1.0940	1.1150			
300.0000	13.1920	1.0940	1.1050			
350.0000	12.6300	1.0950	1.1010			
400.0000	12.2030	1.0960	1.0960			
500.0000	11.5930	1.0990	1.0940			
600.0000	11.1770	1.1010	1.0930			
700.0000	10.8620	1.1030	1.0900			
800.0000	10.6080	1.1050	1.0920			
1000.0000	10.2210	1.1080	1.0900			
1200.0000	9.9410	1.1100	1.0950			
1500.0000	9.6130	1.1130	1.0970			

```
 2000.0000     9.2080     1.1170     1.0960
 2500.0000     8.9070     1.1200     1.0950
 3000.0000     8.6700     1.1220     1.0950
 4000.0000     8.3110     1.1250     1.0950
 5000.0000     8.0460     1.1280     1.0950
NO                 0                    13     1                          .0
  500.0000     6.5510     1.2130     1.1750
 1000.0000     5.3960     1.2290     1.1920
 1500.0000     4.7710     1.2390     1.2040
 2000.0000     4.3500     1.2470     1.2130
 2500.0000     4.0370     1.2530     1.2210
 3000.0000     3.7890     1.2580     1.2270
 4000.0000     3.4130     1.2670     1.2380
 5000.0000     3.1350     1.2750     1.2470
 6000.0000     2.9160     1.2810     1.2560
 7000.0000     2.7370     1.2860     1.2630
 8000.0000     2.5860     1.2910     1.2690
 9000.0000     2.4570     1.2960     1.2760
10000.0000     2.3440     1.3000     1.2810
O                  O                    14     1                          .0
 1000.0000     7.1820     1.1600     1.1410
 1500.0000     6.5640     1.1630     1.1560
 2000.0000     6.1390     1.1650     1.1600
 2500.0000     5.8210     1.1690     1.1630
 3000.0000     5.5670     1.1730     1.1680
 3500.0000     5.3550     1.1770     1.1720
 4000.0000     5.1740     1.1800     1.1800
 4500.0000     5.0160     1.1820     1.1840
 5000.0000     4.8760     1.1840     1.1850
 6000.0000     4.6400     1.1880     1.1820
 7000.0000     4.4380     1.1910     1.1820
 8000.0000     4.2710     1.1950     1.1820
 9000.0000     4.1180     1.1960     1.1810
10000.0000     3.9960     1.1980     1.1810
LAST
2.    0.    1.    0.    0.
0.    2.    1.    0.    1.
0.    0.    0.    2.    1.
0.    0.    0.    0.    0.
0.    0.    0.    0.    0.
 519
                CHEMICAL REACTIONS FROM REF 7
N2     N              N     N     N
3                4.1E22 113000.     -1.5
N2     N2             N     N     N2
3               4.80E17 113000.          -0.5
N2     NO             N     N     NO
3               1.90E17 113000.          -0.5
N2     O              N     N     O
3               1.90E17 113000.          -0.5
N2     O2             N     N     O2
3                1.9E17  113000.         -0.5
NO     N              N     O     N
3                7.9E21  75500.          -1.5
NO     N2             N     O     N2
```

```
3                3.90E20 75000.          -1.5
NC      NO             N       O       NO
3                 7.9E21  75500.         -1.5
NO      O              N       O       O
3                 7.9E21  75500.          -1.5
NO      O2             N       O       O2
3                 3.9E20  75500.         -1.5
N2      O              NO      N
1                 7.0E13  38000.          0.0
N2      O2             NO      NO
1                 4.6E24  64000.          -2.5
NO      O              C2      N
1                 3.2E09  19700.          1.0
O2      N              O       O       N
3                 3.6E19  59500.         -1.0
O2      N2             O       O       N2
3                 4.8E20  59500.         -1.5
O2      NO             O       O       NO
3                 3.6E19  59500.         -1.0
O2      O              O       O       O
3                 6.4E23  59500.         -2.0
O2      O2             O       O       O2
3                1.90E21  59500.         -1.5
N       O              NO+     E-
1                 6.5E11   31900.   0.
 A + B    =    C + D                    1
 A + B + (M)    =    C + (M)            2
 A + B    =    C + D + E                3
 A + B    =    C                        4
 A + (M)    =    B + C + (M)            5
 A + B + C      =    D + E              6
```

3.2 Program Run Preparation

3.2.1 Deck Setup

Normal control cards for EXEC II of UNIVAC 1108 are required. In addition to the JOB, 7/8 FOR , 7/8 XQT and 7/8 EOF cards, 7/8 ASG is also needed for Unit A. If output to a tape and read information from a tape are desired, Unit R and Q are required, respectively for such purposes. Some of the subroutines have the same name but different compiled name, so deletion cards are also used to prevent any duplication in the entry point of a subroutine. A source deck setup is shown in Figure 1.

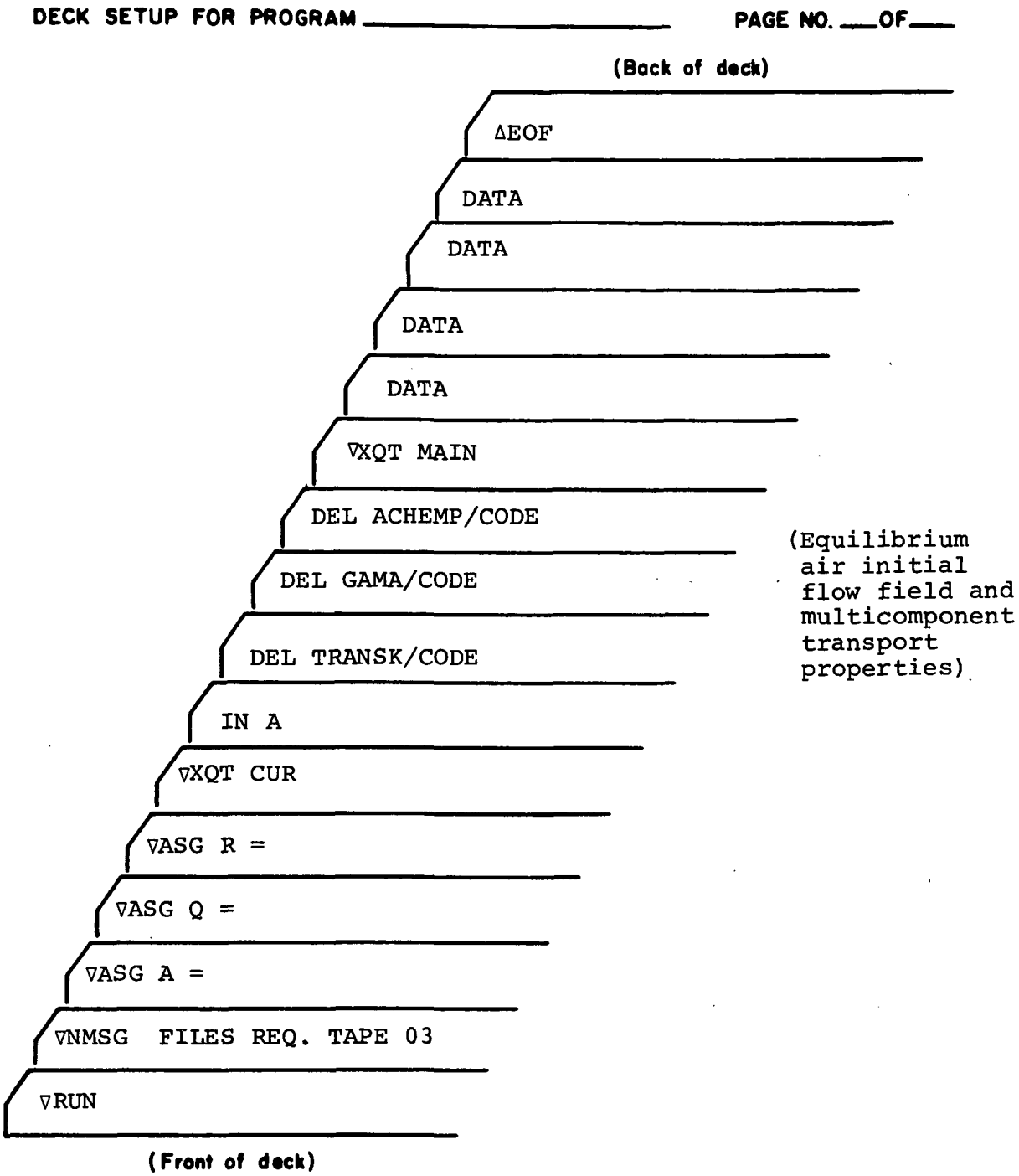

Figure 1. Deck setup for the viscous blunt body flow field computations

3.2.2 Required I/O Devices

Only standard input/output units are required. For example they are units A, or B, Q and R.

3.3 Output Description

All the printed-out data are in the non-dimensional form. The nondimensionalization of these data can be restored by using the relations in Section 2.2 of Part I. Data are available at the final time step, or at any step by using the parameter JA on the input card. Data can also be written on a tape if so desired.

The formats for the data print out are self-explanatory. For every mesh point the first line gives the pressure, temperature, density, velocity components, specific total internal energy, Mach number, location of the mesh point measured along the shock standoff distance and the percentage of the enthalpy dissipation. The second line is for the mass concentrations of species and followed by the local molecular weight of the mixture. Note only the first line is printed out in the non-reacting codes.

On the last mesh line corresponding to the surface of the body, the coefficients of friction and heat transfer are printed out. The percentage of the enthalpy dissipation is not shown for in a highly-cooled body it is close to unity.

If the detailed flow field results are not required at intermediate time steps, the program writes out a few essential parameters, viz., the shock standoff distance, the stagnation pressure and the shock speeds.

4.0 EXECUTION CHARACTERISTICS

4.1 Restrictions

Theoretically speaking, the only known restriction on the mathematical model used for blunt body flow problems is that the free stream Reynolds number should be larger than one. Since the Navier-Stokes equations are the second-moment equations of the second approximation to the Boltzmann equation, the stress and diffusion vectors should have derived from a higher-moment theory. Furthermore, the surface non-slip velocity and non-jump temperature conditions represent a crude condition for highly rarefied gas flow. Thus the application of the present model to the transitional flow regime must be carried out with great caution. For the other limiting case of Reynolds number equal to 10^6 or higher, the numerical dispersion and dissipation may dominate the physical damping in the flow field computation if the mesh spacing used is not sufficiently small. However, if the computer storage and cost are not the major concern to the user, the numerical scheme developed to solve the mathematical model is adequate for nearly all engineering problems. The experiences with the viscous reacting program are gained entirely from the MSC UNIVAC 1108 system. It has 163K (octal) storage and is considered to be a rather fast machine for scientific computations. More than 150 mesh points across the shock layer and 20 mesh points along the body can be used for the non-reacting codes. A relatively large mesh size must be used in the reacting codes, since the number of dependent variables are higher and more than ten subroutines are needed for the calculation of transport properties and chemical rates of production. Nevertheless, 60 points across the layer and 15 points along the body can be used for viscous reacting flow computation.

A preliminary understanding of the problem to be solved would be highly beneficial to the economic application of the programs. For example, it is not always necessary to use the maximum allowable mesh points for the problems considered. If the nose region is of interest, 10 mesh points along the body is enough. If the free stream Reynolds number is less than 10^3, the shock layer is fully viscous, then 20 mesh points across the layer is adequate. It should be noted that if the Reynolds number is less than 500 and the thick shock code is used, the number of mesh points should be in the neighborhood of 40, in order for the shock structure to be accurately defined.

The transformation of the first computational plane to the second plane to achieve a finer space resolution near the body should be used with care. The finer space resolution at the body is obtained at the expense of a sparser space resolution at the shock. This coordinate transformation, therefore, creates difficulties in the calculation of the shock. It has been found that for the same number of mesh points the rate of convergence is slower when the computation is made in the second computational plane instead of the first. The rate of convergence toward the steady solution becomes worse with a larger value of BETA, which provides a higher degree of resolution near the body. The recommended combinations of the number of mesh points across the shock layer and the value of BETA are N=20, β=1; N=30, β=2; or N=45, β=3, etc.

There are limitations on the free stream speed due to the assumptions of vibrational equilibrium and of negligible radiative energy transfer. The calculation of enthalpy,

specific heat, and the Gibbs functions are valid for temperatures lower than 44,000°K. Numerical difficulties will occur when the temperature within the shock layer is higher than the given upper limit. In the applications of the the viscous blunt body program to the trajectory point 4, as discussed in Part 1, the flow field results are not as accurate as the results for other trajectory points at lower altitude, because of the thermodynamic properties of air currently in use.

Finally, some remarks on the selection of coordinate systems are necessary. The body intrinsic system provides the skin friction and heat transfer coefficients as well as other flow properties in the shock layer. But this coordinate system can only be used for a smooth body with no discontinuity in the curvatures.

If the flow field beyond the sonic line is of interest, both the polar and the cylindrical coordinate system can be used, although the polar system is more preferable in practical applications. The shortcomings of these two coordinate systems is that the calculation of the skin friction and heat transfer coefficients is a little involved.

In conclusion, a sufficient large number of mesh points and the body intrinsic coordinates should be used for the accurate calculation of body properties in a high Reynolds number flow. All three types of coordinate systems and a fewer number of mesh points can be used if the major purpose of the computation is to obtain flow properties in the flow field. These programs can be used efficiently to start the downstream supersonic flow field computations.

4.2 Running Time and Accuracy

The running time (or the computation cost) in a finite-difference technique is directly related to the accuracy of the results. The accuracy obtained is proportional to the decreased mesh spacing and increased number of time steps. The increase in accuracy is high when the mesh spacing is first reduced and the number of time steps is increased. But, further improvement of the numerical results is not discernable with finer and finer mesh spacing and more and more time steps. Two criteria have been found to be useful in determining the accuracy and the steadiness of the results. One is the stagnation heat transfer coefficient or the largest skin friction predicted. The accurate calculation of these values depends on the adequate mesh spacing adjacent to the wall. A coarse mesh spacing often leads to erroneous values mainly because of the resultant poor resolution of temperature and velocity profiles near the wall.

Since the existing flow field analyses in the prediction of skin heat transfer and friction coefficients are considered to be satisfactory, a comparison between the present and the existing results would be helpful. The effect of mesh spacing on these coefficients is shown in Figure 5. The second criterion concerns the steadiness of the solution. It is found that when the thin-shock formulation is used the shock speed serves as a good indicator of the time-asymptotic solution. The shock speed at first changes rapidly from time step to time step. As steady state is approached, the shock speed decreases until the shock location is finally stationary and the shock speed maintains

a very low value. An example of this is shown in Figure 4. If the thick-shock formulation is in use, flow property profiles plotted at several time steps should be used to indicate the steadiness of the solution. The steady-state solution is reached when the changes in those profiles are not observable. Figure 7a provides the transient solutions of temperature and the solution obtained at time step K=1000 is very close to the steady state result.

5.0 REFERENCE INFORMATION

5.1 Program Listing

I. Non-reacting thin-shock code

```
@ FOR MAIN,MAIN
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E120100104)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:28

    MAIN PROGRAM

    STORAGE USED: CODE(1) 000466; DATA(0) 000340; BLANK COMMON(2) 00000)

     COMMON BLOCKS:

      0003   MAIN1  000022
      0004   MAIN2  000042
      0005   MAIN3  000010
      0006   MAIN4  000024
      0007   MAIN5  000550
      0010   BODY1  000120
      0011   REGIN1 014710
      0012   DIFF1  042300
      0013   THERM1 014710
      0014   SHOCK1 000074

     EXTERNAL REFERENCES (BLOCK, NAME)

      0015   ACHEM
      0016   VISFLO
      0017   NWDL$
      0020   NIO2$
      0021   NRDL$
      0022   NIO1$
      0023   EXP
      0024   ALOG
      0025   NSTOP$

     STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

      0000   000162 100F    0000   000163 101F    0000   000165 102F    0000   000201 103F    0000   000210 104F
      0000   000211 105F    0000   000213 106F    0000   000232 107F    0000   000245 108F    0000   000252 109F
      0000   000262 110F    0000   000304 120F    0001   000013 137G    0001   000025 145G    0001   000063 171G
      0001   000316 305G    0001   000370 330G    0001   000414 340G    0001   000000 5L      0013   004230 A
      0004 R 000000 ACH     0005 R 000005 AIN     0004 R 000037 ANGLE   0004 R 000041 BETA    0007   000346 BXI
      0010   000074 CURV    0004 R 000013 DNU     0004 R 000016 DNU2    0004 R 000014 DT      0004 R 000012 DXI
      0004 R 000017 DXINU   0004 R 000015 DXI2    0005 R 000003 EIN     0004 R 000034 ELL     0004 R 000025 EPS
      0004   000030 ERR     0004 R 000006 GA      0004 R 000002 GAMMA   0004 R 000007 GB      0004 R 000010 GC
      0004 R 000011 GD      0004 R 000040 GE      0011   000000 HH1     0011   004230 HH2     0011   010460 HH3
      0005 R 000004 HIN     0004   000033 HST     0003 I 000012 I       0003 I 000013 J       0003 I 000006 JA
      0003   000021 JC      0003 I 000014 K       0003 I 000007 KA      0003 I 000017 LB      0003 I 000020 LE
      0003 I 000010 M       0003 I 000000 MA      0003 I 000004 MC      0003 I 000002 MCM     0000 I 000157 MONTH
      0000 I 000161 MYEAR   0003 I 000015 M1      0003 I 000011 N       0003 I 000001 NA      0003 I 000005 NC
      0003 I 000003 NCM     0000 I 000160 NDAY    0000 I 000156 NRUN    0007 R 000024 NU      0000 R 000000 NUBAR
      0003 I 000016 N1      0013   000000 P       0010   000050 PHI     0005 R 000000 PIN     0004 R 000004 PR
      0004   000021 RANGE   0004 R 000003 RE      0005 R 000001 RIN     0007   000202 S       0004 R 000022 SMIN
      0007   000226 SN      0007 R 000372 SQEZ    0007   000252 ST      0004 R 000005 STAB    0007   000276 STN
      0007   000322 SXI     0013   010460 T       0004 R 000020 TIME    0005 R 000002 TIN     0004 R 000036 TW
      0012   000000 U       0005   000006 UIN     0012   021140 UN      0004 R 000001 UO      0005   000007 VIN
      0007 R 000000 XI      0004 R 000035 XIMAX   0010   000000 YB      0014   000000 YS      0004 R 000024 YO
      0006 R 000000 ZA      0010   000024 ZB      0014   000024 ZS      0014   000050 ZSY     0004 R 000023 ZO
```

```
00100      1*      C
00100      2*      C               2D VISCOUS SHOCK LAYER CALCULATION USING CONSERVATIVE
00100      3*      C               EQUATIONS IN THE CURVILINEAR COORDINATE SYSTEM
00100      4*      C
00101      5*            PARAMETER MM=20,NN=110,JJ=4
00103      6*            REAL NU,NUBAR
00104      7*            DIMENSION NUBAR(NN)
00105      8*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00106      9*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106     10*           1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00106     11*           2             ,XIMAX,TW,ANGLE,GE,BETA
00107     12*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00110     13*            COMMON/MAIN4/ZA(20)
00111     14*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00111     15*           1             BXI(MM),SBEZ(NN)
00112     16*            COMMON/BODY1/YB(MM),ZB(MM),PWI(MM),CURV(MM)
00113     17*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00114     18*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00115     19*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00116     20*            COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM)
00116     21*      C
00116     22*      C
00117     23*          100 FORMAT(14I5)
00120     24*          101 FORMAT(7E10.4)
00121     25*          102 FORMAT(//46X,11HRUN NUMBER I4,4H ON I2,1H/,I2,1H/,I2/45X,3HLB=I3,
00121     26*           1       5X,3HLE=I3)
00122     27*          103 FORMAT(1H0,40X,6HGAMMA=E15.7,7X,5HSTAB=E15.7)
00123     28*          104 FORMAT(12A6)
00124     29*          105 FORMAT(1H023X12A6)
00125     30*          106 FORMAT(1H1,32X,53H VISCOUS SHOCK LAYER SOLUTION AT ZERO FLOW INCID
00125     31*           1ENCE / 53X,13H PROGRAM 313Y)
00126     32*          107 FORMAT(/30X,3HMA=I3,5X,3HNA=,I3,5X,3HKA=I6,5X,3HJA=I6,5X,
00126     33*           1       5HBETA=F5.2)
00127     34*          108 FORMAT(1H0,11H EPS 1 TO 7/7E15.6)
00130     35*          109 FORMAT(/36X,3HRE=E10.5,7X,3HPR=E10.5,7X,3HTW=E10.5)
00131     36*          110 FORMAT(1H0,4HU0=,E8.4,7X,4HPIN=,E8.4,7X,4HHIN=,E8.4,7X,4HRIN=,E8.4
00131     37*           1       ,7X,4HTIN=,E8.4,7X,4HEIN=,E8.4,7X,4HACH=,E8.4)
00132     38*          120 FORMAT(//7X,15X,4H Z0=E12.4,10X,4HY0= ,E10.4,10X, 6HXIMAX=,E10.4,
00132     39*           1       10X,6HANGLE=E10.5)
00132     40*      C
00132     41*      C     JC IS THE NUMBER OF DEPENDENT VARIBLES
00132     42*      C     MA IS THE NUMBER OF INTERVALS IN THE XI OR STREAMWISE DIRECTION
00132     43*      C     NA IS THE NUMBER OF INTERVALS IN THE NU OR CROSSSTREAM DIRECTION
00132     44*      C     KA IS THE NUMBER OF TIME STEPS
00132     45*      C     JA IS THE NUMBER OF TIME STEPS FOR OUTPUT
00132     46*      C     LB=0 IS PLANAR FLOW,
00132     47*      C     LB=1 IS AXISYMMETRIC FLOW
00132     48*      C     LE=1 IS ELLIPSOID
00132     49*      C     LE=2 IS PARABOLOID
00132     50*      C     LE=3 IS HYPERBOLID
00132     51*      C     EPS(1) IS TOLERANCE IN SHOCK CALCULATION
00132     52*      C     HIN (FEET/SECOND)**2,
00132     53*      C     PIN LB/FEET**2,
00132     54*      C     U0  FEET/SECOND
```

```
00132     55*     C     RIN SLUGS/FEET**3,
00132     56*     C     TIN RANKINE
00132     57*     C     GAMMA CP/CV
00132     58*     C     STAB =1,
00132     59*     C     ELL   HORIZONTAL/VERTICAL AXIS
00132     60*     C     ZO AND YO ARE THE LOCATION OF BODY ORIGIN
00132     61*     C
00132     62*     C
00133     63*         5 WRITE(6,106)
00135     64*           READ (5,104)(ZA(I),I=1,12)
00143     65*           WRITE(6,105)(ZA(I),I=1,12)
00151     66*           READ(5,100) NRUN,MONTH,NDAY,MYEAR,LB,LE
00161     67*           READ (5,100) MA,NA,KA,JA
00167     68*           READ (5,101)(EPS(M),M=1,3)
00175     69*           READ (5,101) RE,PR,TW,BETA
00203     70*           READ (5,101) U0,PIN,HIN,GAMMA
00211     71*           READ (5,101) STAB,ELL,ZO,YO,XIMAX,ANGLE
00221     72*        11 WRITE(6,102)NRUN,MONTH,NDAY,MYEAR,LB,LE
00231     73*           WRITE(6,107)MA,NA,KA,JA,BETA
00240     74*           WRITE(6,103)GAMMA,STAB
00244     75*           WRITE(6,109)RE,PR,TW
00251     76*           WRITE(6,120)ZO,YO,XIMAX,ANGLE
00257     77*           GA=GAMMA/(GAMMA-1.)
00260     78*           GB=1./(GAMMA-1.)
00261     79*           GC=(GAMMA+1.)/(GAMMA-1.)
00262     80*           GD=(GAMMA+1.)/2.
00263     81*           GE=(GAMMA+1.)/2.
00264     82*           CALL ACHEM (8,PIN,HIN,RIN)
00265     83*           CALL ACHEM (9,PIN,HIN,TIN)
00266     84*           CALL ACHEM (10,PIN,HIN,AIN)
00267     85*           CALL ACHEM (11,PIN,HIN,EIN)
00270     86*           ACH=U0/AIN
00271     87*           ANGLE=ANGLE*0.01745329252
00271     88*     C
00272     89*           WRITE(6,110)U0,PIN,HIN,RIN,TIN,EIN,ACH
00303     90*           WRITE(6,108)(EPS(M),M=1,3)
00303     91*     C
00311     92*           TIME=0.
00312     93*           K=0
00313     94*           J=0
00314     95*           M1=0
00315     96*           N1=0
00316     97*           DT=0.
00316     98*     C
00317     99*           SMIN=ACH**2.
00320    100*           DXI=XIMAX/FLOAT(MA)
00321    101*           DNU=1./FLOAT(NA)
00322    102*           DXI2=DXI*DXI
00323    103*           DNU2=DNU*DNU
00324    104*           DXINU=DXI*DNU*4.
00325    105*           MC=MA+2
00326    106*           NC=NA+2
00326    107*     C
00327    108*           DO 1 M=2,MC
00332    109*         1 XI(M)=DXI*FLOAT(M-2)
00334    110*           XI(1)=-XI(3)
00334    111*     C
00335    112*           MCM=MC-1
```

```
00336     113*            NCN=NC-1
00336     114*      C
00337     115*            DO 2 N=2,NC
00342     116*            NUBAR(N)=DNU*FLOAT(N-2)
00343     117*            NU(N)=ALOG(1.-(1.-EXP(BETA))*NUBAR(N))/BETA
00344     118*            SQEZ(N)=-BETA*EXP(BETA*NU(N))/(1.-EXP(BETA))
00345     119*            IF(BETA.LE.0)NU(N)=NUBAR(N)
00347     120*            IF(BETA.LE.0)SQEZ(N)=1.
00351     121*        2   CONTINUE
00351     122*      C
00351     123*      C
00353     124*            CALL VISFLO
00354     125*            K=0
00355     126*            GO TO 5
00356     127*            END
00356     128*      C
```

END OF COMPILATION: NO DIAGNOSTICS.

SUBROUTINE VISFLO ENTRY POINT 000415

STORAGE USED: CODE(1) 000427; DATA(0) 000102; BLANK COMMON(2) 000007

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000042
0005	MAIN3	000010
0006	MAIN5	000550
0007	DIFF1	042300
0010	THERM1	014710

EXTERNAL REFERENCES (BLOCK, NAME)

0011	BODY
0012	INIT
0013	OUTPUT
0014	EXIT
0015	DIFF
0016	SQRT
0017	NWDL$
0020	NIO2$
0021	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000106	130G	0001	000134	137G	0001	000373	251L	0000	000015	150F	0001	000374	17L
0001	000266	171G	0001	000316	202G	0001	000226	34L	0001	000006	8L	0010 R	004230	A
0004 R	000000	ACH	0005	000005	AIN	0004	000037	ANGLE	0004	000041	BETA	0006	000346	BXI
0000 R	000002	DAM	0000 R	000003	DEM	0000 R	000014	DEM1	0000 R	000000	DIM	0004	000013	DNU
0004	000016	DNU2	0000 R	000011	DOM	0000 R	000013	DOM1	0000 R	000004	DS	0004 R	000014	DT
0000 R	000006	DT1	0000 R	000007	DT2	0000 R	000012	DUM	0004 R	000012	DXI	0004	000017	DXINU
0004	000015	DXI2	0005	000003	EIN	0004	000034	ELL	0004	000025	EPS	0004	000030	ERR
0004	000006	GA	0004 R	000002	GAMMA	0004	000007	GB	0004	000010	GC	0004	000011	GD
0004	000040	GE	0005	000004	HIN	0004	000033	HST	0003	000012	I	0000	000052	INJP$
0003	000013	J	0003 I	000006	JA	0003	000021	JC	0003 I	000014	K	0003 I	000007	KA
0000 I	000010	KM	0000 I	000001	L	0003 I	000017	LB	0003	000020	LE	0003 I	000010	M
0003	000000	MA	0003 I	000004	MC	0003 I	000002	MCM	0000 I	000005	MMM	0003 I	000015	M1
0003 I	000011	N	0003	000001	NA	0003 I	000005	NC	0003 I	000003	NCM	0006 R	000024	NU
0003 I	000016	N1	0010 R	000000	P	0005	000000	PIN	0004	000004	PR	0004 R	000021	RANGE
0004 R	000003	RE	0005	000001	RIN	0006 R	000202	S	0004	000022	SMIN	0006	000226	SN
0006	000372	SQEZ	0006 R	000252	ST	0004 R	000005	STAB	0006	000276	STN	0006	000322	SXI
0010	010460	T	0004 R	000020	TIME	0005	000002	TIN	0004	000036	TW	0007 R	000000	U
0005	000006	UIN	0007	021140	UN	0004	000001	UO	0005	000007	VIN	0006	000000	XI
0004	000035	XIMAX	0004	000024	YO	0004	000023	ZO						

```
00101     1*          SUBROUTINE V1SFLO
00101     2*    C
00102     3*          PARAMETER MM=20,NN=110,JJ=4
00104     4*          REAL NL
00105     5*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00106     6*          COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GE,GC,GD,DXI,DNU,DT,DXI2,D
00106     7*         1            NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00106     8*         2            ,XIMAX,TW,ANGLE,GE,BETA
00107     9*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00110    10*          COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00110    11*         1             BXI(MM),SQEZ(NN)
00111    12*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00112    13*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00112    14*    C
00113    15*        150 FORMAT(1H0,4HSTEP,I4,7H, TIME=  E11.4,20H, STANDOFF DISTANCE=  E11
00113    16*         1       ,4/9X,5HWMAX=  E11.4,7H, WMIN=  E11.4,9H, WRANGE=  E11.4,14
00113    17*         2       H, MAXIM PRESS=  E11.4)
00113    18*    C
00113    19*    C
00113    20*    C     ******************************************************************
00114    21*          CALL BODY
00115    22*          CALL INIT
00116    23*          CALL OUTPUT
00116    24*    C     ******************************************************************
00116    25*    C
00116    26*    C
00116    27*    C     START TIME-DEPENDENT CALCULATION
00117    28*        8 K=K+1
00120    29*          L=L+1
00120    30*    C
00120    31*    C     DETERMINE STEP SIZE
00120    32*    C
00121    33*          N1=0
00122    34*          M1=0
00123    35*          DAM=S(3)*(NU(NC)-NU(NCM))
00124    36*          DEM=DXI
00125    37*          DS=AMIN1(DAM,DEM)
00126    38*          DT=STAB*DS/1.5/(SQRT((J(NC,3,2)/U(NC,3,1))**2,+(U(NC,3,3)/U(NC,3,1
00126    39*         1       ))**2.)+A(NC,3))
00127    40*          DO 34 N=2,NCM
00132    41*          IF(LE.EQ.0)MMM=2
00134    42*          IF(LB.EQ.1)MMM=3
00136    43*          DO 34 M=MMM,MCM
00141    44*          DAM=S(M)*(NU(N+1)-NU(N))
00142    45*          DS=AMIN1(DAM,DEM)
00143    46*          DT1=STAB/(ABS(U(N,M,2)/U(N,M,1))/DEM+ABS(U(N,M,3)/U(N,M,1))/DAM
00143    47*         1        +A(N,M)*SQRT(1./DEM**2.+1./DAM**2.))
00144    48*          DT2=DS**2./8./(SQRT(GAMMA)*ACH/RE)
00145    49*          IF(RE.LT.0.1)DT2=1.0
00147    50*          DT1=AMIN1(DT1,DT2)
00150    51*          IF(DT1-DT)35,34,34
00153    52*       35 DT=DT1
00154    53*          N1=N
00155    54*          M1=M
00156    55*       34 CONTINUE
00161    56*          IF(DT.LT.0.) CALL OUTPUT
00163    57*          IF(DT.LT.0.) CALL EXIT
00163    58*    C
```

```
00163      59*      C      INTERMEDIATE OUTPUT
00163      60*      C
00165      61*          20 KM=K-1
00166      62*             DAM=ST(2)
00167      63*             DOM=DAM
00170      64*             DO 22 M=3,MC
00173      65*             DAM=AMAX1(ST(M),DAM)
00174      66*          22 DOM=AMIN1(ST(M),DOM)
00176      67*             RANGE=ABS(DAM-DOM)
00177      68*             DIM=S(2)
00200      69*             DUM=P(NC,2)
00201      70*             DO 221 M=3,MC
00204      71*             DOM1=P(NC,M)
00205      72*             DEM1=S(M)
00206      73*         221 DUM=AMAX1(DUM,DOM1)
00210      74*             DIM=AMIN1(DIM,DEM1)
00211      75*             TIME=TIME+DT
00212      76*             WRITE(6,150)KM,TIME,DIM,DAM,DOM,RANGE,DUM
00212      77*      C
00212      78*      C
00212      79*      C
00212      80*      C      ***************************************************************
00223      81*             CALL DIFF
00223      82*      C      ***************************************************************
00223      83*      C
00223      84*      C
00224      85*             IF(K.GE.KA) GO TO 17
00226      86*             IF(L.LT.JA) GO TO 15
00226      87*      C      ***************************************************************
00230      88*          16 CALL OUTPUT
00230      89*      C      ***************************************************************
00231      90*             L=0
00232      91*          15 GO TO 8
00232      92*      C
00233      93*          17 CALL OUTPUT
00234      94*             RETURN
00235      95*             END
00235      96*      C
```

END OF COMPILATION: NO DIAGNOSTICS.

UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A -(EXEC8 LEVEL E12U10010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:32

SUBROUTINE BODY ENTRY POINT 000411

STORAGE USED: CODE(1) 000417; DATA(0) 000135; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000042
0005	MAIN5	000550
0006	BODY1	000120

EXTERNAL REFERENCES (BLOCK, NAME)

0007	EXIT
0010	COS
0011	SIN
0012	NERR2$
0013	SQRT
0014	ATAN
0015	NEXP6$
0016	NWDU$
0017	NIO2$
0020	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000		000056	100F	0001		000004	11L	0001		000063	12L	0001		000040	125G
0001		000206	13L	0001		000207	14L	0001		000274	15L	0000		000060	200F
0001		000344	203G	0001		000364	217G	0000		000074	500F	0000	R	000053	AA
0004		000000	ACH	0004	R	000037	ANGLE	0004		000041	BETA	0005	R	000346	BXI
0006	R	000074	CURV	0004		000013	DNU	0004		000016	DNU2	0004		000014	DT
0004	R	000012	DXI	0004		000017	DXINJ	0004		000015	DXI2	0004	R	000034	ELL
0004		000025	EPS	0004		000030	ERR	0004		000006	GA	0004		000002	GAMMA
0004		000007	GB	0004		000010	GC	0004		000011	GD	0004		000040	GE
0004		000033	HST	0003		000012	I	0000		000113	INJP$	0003		000013	J
0003		000006	JA	0003		000021	JC	0003		000014	K	0003		000007	KA
0003		000017	LB	0003	I	000020	LE	0003	I	000010	M	0003		000000	MA
0003 I		000004	MC	0003		000002	MCM	0003		000015	M1	0003	I	000011	N
0003		000001	NA	0003 I		000005	NC	0003		000003	NCM	0005	R	000024	NU
0003		000016	N1	0006	R	000050	PHI	0004		000004	PR	0004		000021	RANGE
0004		000003	RE	0005		000202	S	0004		000022	SMIN	0005		000226	SN
0005	R	000372	SQEZ	0005		000252	ST	0004		000005	STAB	0005		000276	STN
0005		000322	SXI	0000	R	000050	TANE	0004		000020	TIME	0004		000036	TW
0004		000001	UO	0005	R	000000	XI	0004	R	000035	XIMAX	0006	R	000000	YB
0000	R	000052	YBAR	0000	R	000054	YMAX	0004		000024	YO	0006	R	000024	ZB
0000	R	000051	ZBAR	0000	R	000000	ZBY	0000	R	000024	ZBYY	0000	R	000055	ZMAX
0004	R	000023	ZO												

```
00101      1*          SUBROUTINE BODY
00101      2*      C
00101      3*      C   LIMITED TO ANALYTIC BODY SHAPE
```

```
00103      4*            PARAMETER MM=20,NN=110,JJ=4
00104      5*            REAL NL
00105      6*            DIMENSION ZBY(MM),ZBYY(MM)
00106      7*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      8*            COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00107      9*           1              NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00107     10*           2              ,XIMAX,TW,ANGLE,GE,BETA
00110     11*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00110     12*           1              BXI(MM),SBEZ(NN)
00111     13*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00111     14*      C
00112     15*          100 FORMAT(2I3,2F12.6)
00113     16*          200 FORMAT(1H1,20X,2HM=,10X,3HXI=,10X,3HZB=,10X,3HYB=,10X,4HPHI=,10X
00113     17*           1        ,5HCURV=)
00114     18*          500 FORMAT(20X,I2,5X,F8.4,12X,F6.3,6X,F9.5,5X,F9.5,5X,F6.3,6X,F9.5,5X
00114     19*           1        ,F9.5)
00114     20*      C
00115     21*            IF(LE.NE.0) GO TO 11
00117     22*            CALL EXIT
00120     23*           11 CONTINUE
00120     24*      C
00121     25*            PHI(2)=1.57079633
00122     26*            ZB(2)=ZO+1./ELL
00123     27*            TANE=SIN(ANGLE)/COS(ANGLE)
00124     28*            DO 1 M=2,MC
00127     29*            YB(M)=YB(M-1)+DXI*SIN(PHI(M-1))
00130     30*            YB(2)=0.
00130     31*      C
00131     32*            GO TO (12,13,14),LE
00131     33*      C     ELLIPSOID AND CONE
00132     34*           12 ZBAR= ZO+TANE/(ELL*SQRT(ELL**2.+TANE**2.))
00133     35*            YBAR=ELL/SQRT(ELL**2.+TANE**2.)
00134     36*            AA=YBAR+ZBAR*TANE
00135     37*            IF(YB(M).LE.YBAR)ZB(M)=ZO+SQRT(1.-YB(M)**2.)/ELL
00137     38*            IF(YB(M).LE.YBAR)ZBY(M)=-YB(M)/ELL**2./(ZB(M)-ZO)
00141     39*            IF(YB(M).LE.YBAR)ZBYY(M)=-(1.+ELL**2.*ZBY(M)**2.)/ELL**2./
00141     40*           1        (ZB(M)-ZO)
00145     41*            IF(YB(M).GE.YBAR)ZB(M)=-(YB(M)-AA)/TANE
00145     42*            IF(YB(M).GE.YBAR)ZBY(M)=-1./TANE
00147     43*            IF(YB(M).GE.YBAR)ZBYY(M)=0.
00151     44*            GO TO 15
00152     45*           13
00152     46*      C     PARBOLOID AND CONE
00152     47*            GO TO 15
00153     48*           14
00153     49*      C     HYPERBOLOID
00153     50*            ELL=TANE
00154     51*            AA=1./ELL**2.
00155     52*            YMAX=XIMAX
00156     53*            ZMAX=SQRT((YMAX/ELL)**2.+AA**2.)
00157     54*            ZB(2)=ZMAX-SQRT((YB(2)/ELL)**2.+AA**2.)
00160     55*            ZB(M)=ZMAX-SQRT((YB(M)/ELL)**2.+AA**2.)
00161     56*            ZBY(M)=-YB(M)/ELL**2./(ZMAX-ZB(M))
00162     57*            ZBYY(M)=(-1.+(ELL*ZBY(M))**2.)/ELL**2./(ZMAX-ZB(M))
00163     58*            GO TO 15
00164     59*           15 CONTINUE
00165     60*            BXI(M)=0.
00166     61*            PHI(M)=PHI(2)-ATAN(ABS(ZBY(M)))
```

```
00167     62*           CURV(M)=ZBYY(M)/(1.+ZBY(M)**2.)**1.5
00167     63*     C     POSITIVE CURVATURE FOR CONVEX BODY IN THE Y DIRECTIONS
00170     64*           CURV(M)=ABS(CURV(M))
00170     65*     C
00171     66*         1 CONTINUE
00171     67*     C
00173     68*           BXI(1)=-BXI(3)
00174     69*           CURV(1)=CURV(3)
00175     70*           PHI(1)=PHI(3)
00176     71*           YB(1)=YB(3)
00177     72*           ZB(1)=ZB(3)
00177     73*     C
00200     74*           WRITE(6,200)
00202     75*           DO 20 M=2,MC
00205     76*        20 WRITE(6,500)M,XI(M),ZB(M),YB(M),PHI(M),CURV(M)
00216     77*           DO 30 N=2,NC
00221     78*        30 WRITE(6,500)N,SGEZ(N)
00226     79*           RETURN
00227     80*           END
00227     81*     C

      END OF COMPILATION:       NO  DIAGNOSTICS.
```

@ FOR INIT,INIT
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A #(EXEC8 LEVEL E1201001GA)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:34

20 AUG 72 20:40:34.157

SUBROUTINE INIT ENTRY POINT 001153

STORAGE USED: CODE(1) 001165; DATA(0) 000127; BLANK COMMON(2) 000001

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000042
0005	MAIN3	000010
0006	MAIN5	000550
0007	BODY1	000120
0010	DIFF1	042300
0011	THERM1	014710
0012	SHOCK1	000120

EXTERNAL REFERENCES (BLOCK, NAME)

0013	RANKIN
0014	ACHEM
0015	CONVR1
0016	NEXP6$
0017	COS
0020	SIN
0021	ATAN
0022	ALOG
0023	SQRT
0024	NWDL$
0025	NIO2$
0026	EXP
0027	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000047	100F	0001	000030	122G	0001	000074	133G	0001	000113	143G	0001	000151	153G
0000	000055	154F	0001	000526	205L	0001	000534	208L	0001	000511	233G	0001	000676	266G
0001	000753	300G	0001	001056	315G	0001	001113	325G	0001	000347	7L	0011 R	004230	A
0000 R	000006	AB	0000 R	000014	AC	0004 R	000000	ACH	0000 R	000034	AD	0005	000005	AIN
0000 R	000000	AL	0004	000037	ANGLE	0000 R	000035	AQ	0000 R	000024	AST	0004	000041	BETA
0006	000346	BXI	0007	000074	CURV	0000 R	000044	DA	0000 R	000043	DE	0004 R	000013	DNU
0004	000016	DNU2	0000 R	000041	DP	0000 R	000042	DR	0004 R	000014	DT	0000 R	000045	DU
0000 R	000027	DUM	0000 R	000046	DV	0004 R	000012	DXI	0004	000017	DXINU	0004	000015	DXI2
0010 R	036050	E	0005 R	000003	EIN	0004	000034	ELL	0004	000025	EPS	0004	000030	ERR
0000 R	000023	EST	0004 R	000006	GA	0004	000002	GAMMA	0004	000007	GB	0004	000010	GC
0004 R	000011	GD	0004	000040	GE	0000 R	000032	HB	0000 R	000033	HBD	0000 R	000017	HDST
0005 R	000004	HIN	0000 R	000010	HS	0004 R	000033	HST	0003	000012	I	0000	000104	INJP$
0003	000013	J	0003	000006	JA	0003	000021	JC	0003	000014	K	0003	000007	KA
0003	000017	LB	0000 I	000025	LD	0003	000020	LE	0003 I	000010	M	0003	000000	MA
0003 I	000004	MC	0003 I	000002	MCM	0003	000015	M1	0003 I	000011	N	0003	000001	NA
0003 I	000005	NC	0003	000003	NCM	0006 R	000024	NU	0003	000016	N1	0011 R	000000	P
0000 R	000030	PB	0000 R	000031	PBD	0000 R	000016	PDST	0007 R	000050	PHI	0005 R	000000	PIN

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0004   000004 PR        0000 R 000005 PS        0012 R 000074 PSI       0000 R 000015 PST       0010   000000 Q
0010 R 021140 R         0004   000021 RANGE     0000 R 000037 RB        0000 R 000036 RBD       0000 R 000020 RDST
0004   000003 RE        0005 R 000001 RIN       0000 R 000004 RS        0000 R 000021 RST       0006 R 000202 S
0004 R 000022 SMIN      0000 R 000013 SMS       0006   000226 SN        0006   000372 SQEZ      0006 R 000252 ST
0004   000005 STAB      0006   000276 STN       0006 R 000322 SXI       0011 R 010460 T         0000 R 000040 TBD
0000 R 000001 THF       0004   000020 TIME      0005 R 000002 TIN       0000 R 000007 TS        0000 R 000022 TST
0004 R 000036 TW        0010 R 025370 U         0005 R 000006 UIN       0010   021140 UN        0000 R 000011 US
0004 R 000001 UO        0010 R 031620 V         0000 R 000003 VCART     0005   000007 VIN       0000 R 000002 VND
0000 R 000012 VS        0006 R 000000 XI        0000 R 000026 XIBAR     0004   000035 XIMAX     0007 R 000000 YB
0012 R 000000 YS        0004   000024 YO        0007 R 000024 ZB        0012 R 000024 ZS        0012 R 000050 ZSY
0004   000023 ZO
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00101     1*            SUBROUTINE INIT
00101     2*      C
00103     3*            PARAMETER MM=20,NN=110,JJ=4
00104     4*            REAL NU
00105     5*            DIMENSION R(NN,MM),U(NN,MM),V(NN,MM),E(NN,MM)
00106     6*            COMMON/MAIN1/MA,NA,MC,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107     7*            COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00107     8*           1             NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00107     9*           2             ,XIMAX,TW,ANGLE,GG,BETA
00110    10*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00111    11*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00111    12*           1             BXI(MM),SQEZ(NN)
00112    13*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00113    14*            COMMON/DIFF1/Q(NN,MM,JJ),UN(NN,MM,JJ)
00114    15*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00115    16*            COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00116    17*            EQUIVALENCE (UN(1,1,1),R(1,1)),(UN(1,1,2),U(1,1)),(UN(1,1,3),V(
00116    18*           1             1,1)),(UN(1,1,4),E(1,1))
00116    19*      C
00117    20*          100 FORMAT(1HO,22H STAGNATION PRESSURE =E15.7)
00117    21*      C
00117    22*      C     DEFINE SHOCK GEOMETRY
00120    23*              S(2)=.25*ACH/(ACH-1.)**1.1
00120    24*      C
00121    25*            DO 1 M=2,MC
00121    26*      C
00124    27*            S(M)=S(2)
00125    28*            S(M)=S(2)*(1.+((M-2)*0.3/MC)**2.)
00126    29*            YS(M)=YB(M)+S(M)*COS(PHI(M))
00127    30*          1 ZS(M)=ZB(M)+S(M)*SIN(PHI(M))
00131    31*            S(1)=S(3)
00131    32*      C
00132    33*            DO 6 M=3,MCM
00135    34*          6 SXI(M)=(S(M+1)-S(M-1))/2./DXI
00137    35*            SXI(MC)=(S(MC)-S(MCM))/DXI
00140    36*            SXI(1)=-SXI(3)
00141    37*            SXI(2)=0.
00141    38*      C
00142    39*            DO 21 M=3,MCM
00145    40*            AL=(YS(M+1)-YS(M))/(YS(M)-YS(M-1))
00146    41*         21 ZSY(M)=(ZS(M+1)+(AL*AL-1.)*ZS(M)-AL*AL*ZS(M-1))/(AL+1.)/
00146    42*           1       (YS(M+1)-YS(M))
00150    43*            ZSY(2)=0.
```

S(2) = S(3)/3.

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00151    44*                ZSY(1,C)=2,*ZSY(MCM)-ZSY(MCM-1)
00151    45*          C
00152    46*                DO 7 M=2,MC
00155    47*                THE=ATAN(ABS(ZSY(M)))
00156    48*                THE=1,5708-THE
00157    49*                VND=UG*SIN(THE)
00160    50*                CALL RANKIN(VND,VCART,RS,PS,AB,TS)
00161    51*                HS=HIN/PIN*RIN+,5*(1,+1,/RS)*(PS-1,)
00162    52*                E(2,M)=HS-PS/RS
00163    53*                A(2,M)=AB
00164    54*                PSI(M)=THE-PHI(M)
00165    55*                R(2,M)=ALOG(RS)
00166    56*                P(2,M)=ALOG(PS)
00167    57*                T(2,M)=TS
00170    58*                UIN=UG*COS(THE)/SQRT(PIN/RIN)
00171    59*                US=UIN
00172    60*                VS=VCART
00173    61*                U(2,M)=US*COS(PSI(M))+VS*SIN(PSI(M))
00174    62*                V(2,M)=US*SIN(PSI(M))-VS*COS(PSI(M))
00175    63*                ST(M)=0,
00176    64*                SMS=(U(2,M)**2,+V(2,M)**2,)/AB**2,
00177    65*                IF(S(M),GT.0.AND.SMS,LT,SMIN) GO TO 7
00201    66*                WRITE(6,154)
00203    67*            154 FORMAT(34H MACH NUMBER BEHIND SHOCK TOO HIGH)
00204    68*              7 CONTINUE
00204    69*          C
00204    70*          C     DEFINE THE STAGNATION POINT
00204    71*          C
00206    72*                AC=V(2,2)/A(2,2)
00207    73*                PST=EXP(P(2,2))*(1,+GO*(AC**2,))**GA
00210    74*                SMS=AC**2,
00211    75*                PDST=PST*PIN
00212    76*                HDST=HIN+UO**2,/2,
00213    77*                HST=HDST/PIN*RIN
00214    78*                CALL ACHEM(8,PDST,HDST,RDST)
00215    79*                RST=RDST/RIN
00216    80*                CALL ACHEM(9,PDST,HDST,TST)
00217    81*                T(NC,2)=TST/TIN
00220    82*                EST=HST-PST/RST
00221    83*                U(NC,2)=0,
00222    84*                V(NC,2)=0,
00223    85*                P(NC,2)=ALOG(PST)
00224    86*                R(NC,2)=ALOG(RST)
00225    87*                E(NC,2)=EST
00226    88*                CALL ACHEM(10,PDST,HDST,AST)
00227    89*                A(NC,2)=AST/SQRT(PIN/RIN)
00227    90*          C
00230    91*                LD=3*MC/4
00230    92*          C
00231    93*                XIBAR=XI(LD)
00231    94*          C
00231    95*          C     DEFINE VALUE ON THE BODY
00231    96*          C
00232    97*                DO 2 M=2,MC
00235    98*                IF(M,GT,LD) GO TO 205
00237    99*                SMS=(XI(M)/XIBAR)**2,
00240   100*                GO TO 208
00241   101*            205 SMS=(1,+XI(M)/XIBAR)**2,/3,
```

```
00242    102*          208 DUM=1.+GD*SMS
00243    103*              PB=PST/DUM**GA
00244    104*              PBD=PB*PIN
00245    105*              HB=(1.-(M-2)/8.)/(MCM-1))*HST
00246    106*              HBD=HB*PIN/RIN
00247    107*              CALL ACHEM(10,PBD,HBD,AD)
00250    108*              AG=AD/SQRT(PIN/RIN)
00251    109*              CALL ACHEM(8,PBD,HBD,RBD)
00252    110*              RB=RBD/RIN
00253    111*              R(NC,M)=ALOG(RB)
00254    112*              CALL ACHEM(9,PBD,HBD,TBD)
00255    113*              T(NC,M)=TBD/TIN
00256    114*              A(NC,M)=AG
00257    115*              P(NC,M)=ALOG(PB)
00260    116*              E(NC,M)=HB-PB/RB
00261    117*              U(NC,M)=0.
00262    118*              V(NC,M)=0.
00263    119*            2 CONTINUE
00263    120*      C
00263    121*      C       INTERPOLATE VALUES BETWEEN SHOCK AND BODY
00263    122*      C
00265    123*              DO 3 M=2,MC
00270    124*              DP=(P(NC,M)-P(2,M))*DNJ
00271    125*              DR=(R(NC,M)-R(2,M))*DNJ
00272    126*              DE=(E(NC,M)-E(2,M))*DNJ
00273    127*              DA=(A(NC,M)-A(2,M))*DNJ
00274    128*              DT=(T(NC,M)-T(2,M))*DNJ
00275    129*              DU=(U(NC,M)-U(2,M))*DNJ
00276    130*              DV=(V(NC,M)-V(2,M))*DNJ
00276    131*      C
00277    132*              DO 3 N=2,NC
00302    133*              P(N,M)=P(2,M)+DP*FLOAT(N-2)
00303    134*              R(N,M)=R(2,M)+DR*FLOAT(N-2)
00304    135*              T(N,M)=T(2,M)+DT*FLOAT(N-2)
00305    136*              E(N,M)=E(2,M)+DE*FLOAT(N-2)
00306    137*              A(N,M)=A(2,M)+DA*FLOAT(N-2)
00307    138*              U(N,M)=U(2,M)+DU*FLOAT(N-2)
00310    139*              V(N,M)=V(2,M)+DV*FLOAT(N-2)
00311    140*            3 CONTINUE
00311    141*      C
00314    142*              DO 5 M=2,MC
00317    143*              R(NC,M)=R(NC,M)+ALOG(T(NC,M)/TW)
00320    144*              T(NC,M)=TW
00321    145*              E(NC,M)=TW*EIN/PIN*RIN
00322    146*            5 CONTINUE
00322    147*      C
00324    148*              DO 4 N=2,NC
00327    149*              P(N,1)=P(N,3)
00330    150*              R(N,1)=R(N,3)
00331    151*              T(N,1)=T(N,3)
00332    152*              A(N,1)=A(N,3)
00333    153*              E(N,1)=E(N,3)
00334    154*              U(N,1)=-U(N,3)
00335    155*              V(N,1)=V(N,3)
00336    156*            4 CONTINUE
00336    157*      C
00340    158*              CALL CONVR1
00340    159*      C
```

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00341     160*          RETURN
00342     161*          END
00342     162*     C
```

END OF COMPILATION: NO DIAGNOSTICS.

```
@ FOR CONVR1,CCNVR1                                                    20 AUG 72          20140137.346
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  =(EXEC8 LEVEL E120100104)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:37

    SUBROUTINE CONVR1    ENTRY POINT 000140

    STORAGE USED: CODE(1) 000151; DATA(0) 000026; BLANK COMMON(2) 00000)

    COMMON BLOCKS:

     0003   MAIN1  000022
     0004   DIFF1  042300
     0005   MAIN5  000550
     0006   REGIN1 014710
     0007   THERM1 014710

    EXTERNAL REFERENCES (BLOCK, NAME)

     0010   REGION
     0011   EXP
     0012   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001   000022 116G      0001   000031 123G      0001   000101 137G      0001   000103 142G      0001   000104 145G
     0007   004230 A         0005   000346 BXI       0004 R 036050 B         0006 R 000000 HH1       0006 R 004230 HH2
     0006   010460 HH3       0000 R 000000 H123      0003   000012 I         0000   000004 INJP$     0003 I 000013 J
     0003   000006 JA        0003   000021 JC        0003   000014 K         0003   000007 KA        0003   000017 LB
     0003   000020 LE        0003 I 000010 M         0003   000000 MA        0003 I 000004 MC        0003   000002 MCM
     0003   000015 M1        0003 I 000011 N         0003   000001 NA        0003 I 000005 NC        0003   000003 NCM
     0005 R 000024 NU        0003   000016 N1        0007 R 000000 P         0004 R 000000 Q         0004 R 021140 R
     0005 R 000202 S         0005 R 000226 SN        0005   000372 SQEZ      0005 R 000252 ST        0005 R 000276 STN
     0005   000322 SXI       0007   010460 T         0004 R 025370 U         0004 R 021140 UN        0004 R 031620 V
     0005   000000 XI

00101      1*              SUBROUTINE CONVR1
00101      2*      C
00103      3*              PARAMETER MM=20,NN=110,JJ=4
00104      4*              REAL NU
00105      5*              DIMENSION R(NN,MM),U(NN,MM),V(NN,MM),E(NN,MM)
00106      6*              COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      7*              COMMON/DIFF1/Q(NN,MM,JJ),UN(NN,MM,JJ)
00110      8*              COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00110      9*             1             BXI(MM),SQEZ(NN)
00111     10*              COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00112     11*              COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00113     12*              EQUIVALENCE (UN(1,1,1),R(1,1)),(UN(1,1,2),U(1,1)),(UN(1,1,3),V(
00113     13*             1            1,1)),(UN(1,1,4),E(1,1))
00113     14*      C
00114     15*              CALL REGION
00114     16*      C
```

```
00115     17*                 DO 1 M=1,MC
00120     18*                 SN(M)=S(M)
00121     19*                 STN(M)=ST(M)
00122     20*                 DO 1 N=2,NC
00125     21*                 H123=HH1(N,M)*HH2(N,M)
00126     22*                 Q(N,M,1)=H123*EXP(R(N,M))
00127     23*                 Q(N,M,2)=Q(N,M,1)*U(N,M)
00130     24*                 Q(N,M,3)=Q(N,M,1)*V(N,M)
00131     25*                 Q(N,M,4)=Q(N,M,1)*(E(N,M)+0.5*(U(N,M)**2.+V(N,M)**2.))
00132     26*                 P(N,M)=EXP(P(N,M))
00133     27*               1 CONTINUE
00133     28*       C
00136     29*                 DO 2 J=1,JJ
00141     30*                 DO 2 M=1,MC
00144     31*                 DO 2 N=2,NC
00147     32*                 Q(N,M,J)=Q(N,M,J)*S(M)
00150     33*                 UN(N,M,J)=Q(N,M,J)
00151     34*               2 CONTINUE
00151     35*       C
00151     36*       C
00155     37*                 RETURN
00156     38*                 END
00156     39*       C
```

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END OF COMPILATION: NO DIAGNOSTICS.

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FORM 1411-3

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@ FOR REGION,REGION                                                    20 AUG 72          20:40:38.767
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:38


    SUBROUTINE REGION    ENTRY POINT 000115

    STORAGE USED: CODE(1) 000124; DATA(0) 000021; BLANK COMMON(2) 000000

     COMMON BLOCKS:

     0003   MAIN1  000022
     0004   BODY1  000120
     0005   MAIN5  000550
     0006   REGIN1 014710

    EXTERNAL REFERENCES (BLOCK, NAME)

     0007   COS
     0010   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001   000020 112G      0001   000034 115G      0001   000071 130G      0005   000346 BXI       0004 R 000074 CURV
     0006 R 000000 HH1       0006 R 004230 HH2       0006 R 010460 HH3       0003   000012 I         0000   000001 INJP$
     0003   000013 J         0003   000006 JA        0003   000021 JC        0003   000014 K         0003   000007 KA
     0003 I 000017 LB        0003   000020 LE        0003 I 000010 M         0003   000000 MA        0003 I 000004 MC
     0003   000002 MCM       0003   000015 M1        0003 I 000011 N         0003   000001 NA        0003 I 000005 NC
     0003   000003 NCM       0005 R 000024 NU        0003   000016 N1        0004 R 000050 PHI       0005 R 000202 S
     0005   000226 SN        0005   000372 SQEZ      0005   000252 ST        0005   000276 STN       0005   000322 SXI
     0005   000000 XI        0004 R 000000 YB        0004   000024 ZB

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00101     1*            SUBROUTINE REGION
00101     2*      C
00103     3*            PARAMETER MM=20,NN=110,JJ=4
00104     4*            REAL NU
00105     5*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00106     6*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00107     7*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00107     8*           1             BXI(MM),SQEZ(NN)
00110     9*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00110    10*      C
00110    11*      C
00111    12*            DO 1 M=1,MC
00114    13*            DO 1 N=2,NC
00117    14*            HH1(N,M)=1.+CURV(M)*S(M)*(1.-NU(N))
00120    15*            HH2(N,M)=1.
00121    16*            HH3(N,M)=YB(M)+S(M)*(1.-NU(N))*COS(PHI(M))
00122    17*            IF(LB.EQ.0)HH3(N,M)=1.
00124    18*          1 CONTINUE
00124    19*      C
00127    20*            DO 2 N=2,NC
```

```
00132      21*            HH3(N,1)=-HH3(N,3)
00133      22*            IF(LP.EQ.0)HH3(N,1)=1.
00135      23*         2  CONTINUE
00135      24*      C
00137      25*            RETURN
00140      26*            END
00140      27*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

SUBROUTINE DIFF ENTRY POINT 001450

STORAGE USED: CODE(1) 001472; DATA(0) 000227; BLANK COMMON(2) 000001

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000042
0005	MAIN5	000550
0006	STRES1	000005
0007	HEAT1	000002
0010	CONR2	000023
0011	THERM1	014710
0012	DIFF1	042300
0013	DIFF2	000005

EXTERNAL REFERENCES (BLOCK, NAME)

0014	CONVR2
0015	STRESS
0016	HEAT
0017	SHOCK
0020	WALL
0021	THERM
0022	NERR$$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000752	11L	0001	000530	114L	0001	000362	12L	0001	000006	122G
0001	000747	122L	0001	000050	125G	0001	000605	13L	0001	000070	130G
0001	000127	133G	0001	000670	14L	0001	000707	15L	0001	000515	214G
0001	000574	225G	0001	000734	252G	0001	001034	272G	0001	001215	321G
0001	001217	325G	0001	001257	336G	0001	001272	347G	0001	001273	352G
0001	001274	355G	0001	001315	371G	0001	001330	374G	0001	001305	4L
0001	000002	5L	0011 R	004230	A	0004	000000	ACH	0004	000037	ANGLE
0004 R	000041	BETA	0005 R	000346	BXI	0004 R	000013	DNU	0000 R	000121	DNUBAR
0004	000016	DNU2	0004 R	000014	DT	0004 R	000012	DXI	0004	000017	DXINU
0004	000015	DXI2	0004	000034	ELL	0004	000025	EPS	0004	000030	ERR
0000 R	000000	F	0000 R	000124	FXI	0000 R	000044	G	0004	000006	GA
0004	000002	GAMMA	0004	000007	GB	0004	000010	GC	0004	000011	GD
0004	000040	GE	0000 R	000123	GNU	0000 R	000110	H	0004	000033	HST
0010 R	000000	H1	0010 R	000013	H1NU	0010	000015	H1XI	0010	000003	H12
0010	000006	H123	0010 R	000001	H2	0010 R	000016	H2NU	0010 R	000014	H2XI
0010 R	000004	H23	0010 R	000002	H3	0010 R	000020	H3NU	0010 R	000017	H3XI
0010 R	000021	H3XINU	0010 R	000022	H3XIXI	0010 R	000005	H31	0003	000012	I
0013 I	000000	II	0000 I	000122	III	0000	000144	INJP$	0003 I	000013	J
0003	000006	JA	0003	000021	JC	0003	000014	K	0003	000007	KA
0003 I	000017	LB	0003	000020	LE	0003 I	000010	M	0003	000000	MA
0003 I	000004	MC	0003 I	000002	MCM	0000 I	000115	MI	0000 I	000117	ML
0003	000015	M1	0003 I	000011	N	0003	000001	NA	0003 I	000005	NC
0003	000003	NCM	0000 I	000114	NI	0000 I	000116	NL	0005 R	000024	NU
0003	000016	N1	0011 R	000000	P	0006 R	000000	PI11	0006 R	000001	PI12
0006 R	000002	PI21	0006 R	000003	PI22	0006 R	000004	PI33	0004	000004	PR
0007 R	000000	Q1	0007 R	000001	Q2	0004	000021	RANGE	0004	000003	RE
0000 R	000120	RR	0005 R	000202	S	0004	000022	SMIN	0005	000226	SN
0005 R	000372	SQEZ	0005 R	000252	ST						

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0004   000005 STAB      0005   000276 STN       0005 R 000522 SXI       0011 R 010460 T         0004   000020 TIME
0004   000036 TW        0012 R 000000 U         0012 R 021140 UN        0013 R 000001 UT        0000 R 000125 UU
0004   000001 U0        0010 R 000007 U1        0010 R 000010 U2        0010 R 000011 U3        0010 R 000012 U4
0005   000000 XI        0004   000035 XIMAX     0004   000024 Y0        0004   000023 Z0
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00101      1*            SUBROUTINE DIFF
00101      2*      C
00103      3*            PARAMETER MN=20,NN=110,JJ=4
00104      4*            REAL NL
00105      5*            DIMENSION F(3,3,JJ),G(3,3,JJ),H(JJ)
00106      6*            COMMON/MAIN1/MA,NA,MCN,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      7*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNJ,DT,DXI2,D
00107      8*           1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00107      9*           2             ,XIMAX,TW,ANGLE,GE,BETA
00110     10*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00110     11*           1             BXI(MM),SBEZ(NN)
00111     12*            COMMON/STRESS/PI11,PI12,PI21,PI22,PI33
00112     13*            COMMON/HEAT1/Q1,Q2
00113     14*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00113     15*           1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00114     16*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00115     17*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00116     18*            COMMON/DIFF2/II,UT(JJ)
00116     19*      C
00116     20*      C     SOLVE THE DIFFERENTIAL EQUATION
00117     21*            II=1
00120     22*          5 CONTINUE
00121     23*            DO 1 N=2,NC
00124     24*            DO 1 M=2,MCM
00124     25*      C
00127     26*              DO 11 NI=1,3
00132     27*              DO 11 MI=1,3
00135     28*            IF(NI.NE.2.AND.MI.NE.2) GO TO 11
00137     29*            IF(II.EQ.1.AND.MI+NI.ST.4.AND.N.NE.2) GO TO 11
00141     30*            IF(II.EQ.1.AND.MI+NI.LT.4.AND.N.NE.NC) GO TO 11
00143     31*              IF(NI.EQ.1) NL=N-1
00145     32*              IF(NI.EQ.2) NL=N
00147     33*              IF(NI.EQ.3) NL=N+1
00151     34*              IF(MI.EQ.1) ML=M-1
00153     35*              IF(MI.EQ.2) ML=M
00155     36*              IF(MI.EQ.3) ML=M+1
00157     37*            IF(NL.EQ.1.OR.NL.EQ.NC+1) GO TO 11
00157     38*      C
00161     39*            CALL CONVR2(NL,ML)
00162     40*            CALL STRESS(NL,ML)
00163     41*            CALL HEAT(NL,ML)
00163     42*      C       VECTORS IN THE PHYSICAL SPACE
00164     43*              F(NI,MI,1)=H23*U1*U2
00165     44*              F(NI,MI,2)=H23*(U1*U2*U2+PI11)
00166     45*              F(NI,MI,3)=H23*(U1*U2*U3+PI12)
00167     46*              F(NI,MI,4)=H23*((U1*U4+PI11)*U2+PI12*U3+Q1)
00167     47*      C
00170     48*            IF(MI.NE.2) GO TO 12
00172     49*              G(NI,MI,1)=H31*U1*U3
00173     50*              G(NI,MI,2)=H31*(U1*U2*U3+PI21)
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00174     51*              G(NI,MI,3)=H31*(U1*U3*U3+PI22)
00175     52*              G(NI,MI,4)=H31*((U1*U4+PI22)*U3+PI21*U2+U2)
00176     53*        12  CONTINUE
00176     54*      C
00176     55*      C     VECTORS IN THE FIRST COMPUTATIONAL PLANE
00176     56*      C
00177     57*           RR=((1.-NU(NL))*SXI(ML)+SXI(ML))/S(ML)
00177     58*      C
00200     59*           IF(NI.NE.2.OR.MI.NE.2) GO TO 13
00202     60*              H(1)=0.
00203     61*              H(2)=S(ML)*((-1./S(ML))*H1NU*(U1*U2*U3+PI12)
00203     62*          1           -(H2XI+RR*H2NU)*(U1*U3*U3+PI22))
00204     63*              H(3)=S(ML)*((H2XI+RR*H2NU)*(U1*U2*U3+PI12)
00204     64*          1           -(-1./S(ML))*H1NU*(U1*U2*U2+PI11))
00205     65*              H(4)=0.
00206     66*           IF(LR.EQ.0) GO TO 13
00210     67*           IF(M.NE.2) GO TO 114
00212     68*           H(3)=H(3)+S(ML)*H1*PI33*(-1./S(ML))*H3XINU/H3XI
00213     69*           DO 103 J=1,JJ
00216     70*        103 H(J)=H(J)+S(ML)*((-1./S(ML))*H3XINU*G(NI,MI,J)+(H3XIXI+
00216     71*          1    (1.-NU(NL))*(SXI(ML+1)-SXI(ML-1))/S(ML)**2.*H3NU)*F(NI,MI,J))/
00216     72*          2      H3XI
00220     73*           GO TO 13
00221     74*        114 CONTINUE
00222     75*           H(2)=H(2)+S(ML)*H2/H3*(H3XI+RR*H3NU)*PI33
00223     76*           H(3)=H(3)+S(ML)*H1/H3*(-1./S(ML))*H3NU*PI33
00224     77*           DO 113 J=1,JJ
00227     78*        113 H(J)=H(J)+S(ML)/H3*((H3XI+RR*H3NU)*F(NI,MI,J)+(-1./S(ML))*
00227     79*          1      H3NU*G(NI,MI,J))
00231     80*        13  CONTINUE
00231     81*      C
00232     82*           IF(MI.NE.2) GO TO 14
00234     83*           RR=RR*S(ML)
00235     84*           G(NI,MI,1)=-G(NI,MI,1)+RR*F(NI,MI,1)
00235     85*          1           +(1.+NU(NL))*ST(ML)*U(NL,ML,1)/S(ML)
00236     86*           G(NI,MI,2)=-G(NI,MI,2)+RR*F(NI,MI,2)
00236     87*          1           +(1.+NU(NL))*ST(ML)*U(NL,ML,2)/S(ML)
00237     88*           G(NI,MI,3)=-G(NI,MI,3)+RR*F(NI,MI,3)
00237     89*          1           +(1.+NU(NL))*ST(ML)*U(NL,ML,3)/S(ML)
00240     90*           G(NI,MI,4)=-G(NI,MI,4)+RR*F(NI,MI,4)
00240     91*          1           +(1.+NU(NL))*ST(ML)*U(NL,ML,4)/S(ML)
00241     92*        14  CONTINUE
00241     93*      C
00242     94*           IF(NI.NE.2) GO TO 15
00244     95*           F(NI,MI,1)=S(ML)*F(NI,MI,1)
00245     96*           F(NI,MI,2)=S(ML)*F(NI,MI,2)
00246     97*           F(NI,MI,3)=S(ML)*F(NI,MI,3)
00247     98*           F(NI,MI,4)=S(ML)*F(NI,MI,4)
00250     99*        15  CONTINUE
00250    100*      C
00250    101*      C
00250    102*      C     VECTORS IN THE SECOND COMPUTATIONAL PLANE
00250    103*      C
00251    104*           DO 122 J=1,4
00254    105*           IF(NI.EQ.2.AND.MI.EQ.2)H(J)=H(J)-BETA*G(NI,MI,J)
00256    106*           IF(MI.NE.2) GO TO 122
00260    107*           G(NI,MI,J)=SQEZ(NL)*G(NI,MI,J)
00261    108*        122 CONTINUE
```

```
00263     109*          11   CONTINUE
00263     110*     C
00266     111*               DNUBAR=DNU/SQEZ(N)
00267     112*               DT=AMIN1(DXI/(ABS(U(N,M,2)/U(N,M,1))+A(N,M)),
00267     113*              1         DNUBAR*S(M)/(ABS(U(N,M,3)/U(N,M,1))+A(N,M)))
00270     114*               DT=DT/3.
00270     115*     C
00271     116*                 DO 22 J=1,JJ
00274     117*                 III=II
00275     118*                 IF(N,EQ,2) II=1
00277     119*                 IF(N,EQ,NC)II=-1
00301     120*                  GNU=((II-1)*G(1,2,J)+2*II*G(2,2,J)+(II+1)*G(3,2,J))/2,/DNU
00302     121*                 II=III
00303     122*                  FXI=((II-1)*F(2,1,J)+2*II*F(2,2,J)+(II+1)*F(2,3,J))/2,/DXI
00303     123*     C
00304     124*               IF(LB,EQ,1,AND,M,EQ,2)FXI=2,*FXI
00306     125*                  UT(J)=-FXI-GNU-H(J)
00307     126*               IF(II,EQ,1)UN(N,M,J)=U(N,M,J)+UT(J)*DT
00311     127*               IF(II,EQ,-1)UN(N,M,J)=0,5*(U(N,M,J)+UN(N,M,J)+UT(J)*DT)
00313     128*            22 CONTINUE
00313     129*     C
00315     130*            1  CONTINUE
00315     131*     C
00315     132*     C
00315     133*     C      EXTRAPOLATION TO THE AXIS OF SYMMETRY
00315     134*     C
00315     135*     C
00315     136*     C      EXTRAPOLATION TO OUTER BOUNDARY
00315     137*     C
00320     138*               DO 2 N=2,NC
00323     139*               UN(N,2,2)=0,
00324     140*               DO 2 J=1,JJ
00327     141*               UN(N,MC,J)=2.*UN(N,MCM,J)-UN(N,MCM-1,J)
00330     142*            2  CONTINUE
00330     143*     C
00333     144*               CALL SHOCK
00334     145*               CALL WALL
00334     146*     C
00334     147*     C
00334     148*     C      DEFINE MIRROR POINTS
00334     149*     C
00335     150*               DO 3 N=2,NC
00340     151*               UN(N,1,1)=UN(N,3,1)
00341     152*               UN(N,1,2)=-UN(N,3,2)
00342     153*               UN(N,1,3)=UN(N,3,3)
00343     154*               UN(N,1,4)=UN(N,3,4)
00344     155*            3 CONTINUE
00344     156*     C
00344     157*     C      STORE VALUES TO DIFFERENT LEVEL
00344     158*     C
00346     159*               DO 4 J=1,JJ
00351     160*               DO 4 M=1,MC
00354     161*               DO 4 N=2,NC
00357     162*               UU=U(N,M,J)
00360     163*               U(N,M,J)=UN(N,M,J)
00361     164*               IF(II,EQ,-1) GO TO 4
00363     165*               UN(N,M,J)=UU
00364     166*            4 CONTINUE
```

GNU = SQEZ(N) * GNU

```
00364    167*      C
00364    168*      C     EXTRAPOLATION TO THE AXIS OF SYMMETRY
00364    169*      C
00370    170*            DO 6 N=2,NC
00372    171*            DO 7 M=2,MC
00376    172*            CALL CONVR2(N,M)
00377    173*            U4=U4+0,5*(U2**2,+U3**2,)
00400    174*            CALL THERM(1,U1,U4,P(N,M))
00401    175*            CALL THERM(2,U1,U4,T(N,M))
00402    176*            CALL THERM(3,U1,U4,A(N,M))
00403    177*          7 CONTINUE
00405    178*            P(N,1)=P(N,3)
00406    179*            T(N,1)=T(N,3)
00407    180*            A(N,1)=A(N,3)
00410    181*          6 CONTINUE
00410    182*      C
00412    183*            IF(II,EQ,+1) RETURN
00414    184*            II=+1
00415    185*            GO TO 5
00415    186*      C
00416   *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00416    187*            END

        END OF COMPILATION;          1 DIAGNOSTICS,
```

```
@ FOR SCHEME,SCHEME                                                    20 AUG 72          20:40:43.784
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E120100104)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:43


     SUBROUTINE SCHEME    ENTRY POINT 000172

     STORAGE USED: CODE(1) 000200; DATA(0) 000263; BLANK COMMON(2) 000007

      COMMON BLOCKS:

      0003   MAIN1  000022
      0004   MAIN2  000041
      0005   DIFF1  042300
      0006   DIFF2  000005

     EXTERNAL REFERENCES (BLOCK, NAME)

      0007   NERR3$

     STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

      0001   000056 IL        0004   000000 ACH       0004   000037 ANGLE     0004   000013 DNU       0004   000016 DNU2
      0004 R 000014 DT        0004   000012 DXI       0004   000017 DXINU     0004   000015 DX12      0004   000034 ELL
      0004   000025 EPS       0004   000030 ERR       0004   000006 GA        0004   000002 GAMMA     0004   000007 GB
      0004   000010 GC        0004   000011 GD        0004   000040 GE        0004   000033 HST       0003   000012 I
      0006 I 000000 II        0000   000243 INUPS     0003 I 000013 J         0003   000006 JA        0003   000021 JC
      0003   000014 K         0003   000007 KA        0003   000017 LB        0003   000020 LE        0003 I 000010 M
      0003   000000 MA        0003   000004 MC        0003   000002 MCM       0003   000015 M1        0003 I 000011 N
      0003   000001 NA        0003 I 000005 NC        0003   000003 NCM       0000 I 000240 NNN       0000 I 000241 NNNN
      0003   000016 N1        0004   000004 PR        0004   000021 RANGE     0004   000003 RE        0004   000022 SMIN
      0004   000005 STAB      0004   000020 TIME      0004   000036 TW        0005 R 000000 U         0005 R 021140 UN
      0006 R 000001 UT        0000 R 000000 UU        0004   000001 UO        0004   000035 XIMAX     0004   000024 YO
      0004   000023 ZO


   00101     1*            SUBROUTINE SCHEME
   00103     2*            PARAMETER MM=20,NN=110,JJ=4
   00104     3*            DIMENSION UU(2,MM,JJ)
   00105     4*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
   00106     5*            COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DX12,D
   00106     6*           1             NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
   00106     7*           2             ,XIMAX,TW,ANGLE,GE
   00107     8*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
   00110     9*            COMMON/DIFF2/II,UT(JJ)
   00110    10*      C
   00111    11*            NNN=1
   00112    12*            IF(N/2.EQ.(N+1)/2)NNN=2
   00114    13*            IF(N.GE.2.AND.N.LT.4) GO TO 1
   00116    14*            UN(N-2,M,J)=UU(NNN,M,J)
   00117    15*        1   CONTINUE
   00117    16*      C
   00120    17*            IF(II.EQ.-1)UU(NNN,M,J)=U(N,M,J)+UT(J)*DT
```

```
00122     18*           IF(II.EQ.1)UU(NNN,M,J)=0.5*(U(N,M,J)+UN(N,M,J)*UT(J)*DT)
00124     19*           IF(N.EQ.NC)UN(N,M,J)=UU(NNN,M,J)
00126     20*           IF(NNN.EQ.1)NNNN=2
00130     21*           IF(NNN.EQ.2)NNNN=1
00132     22*           IF(N.EQ.NC)UN(N=1,M,J)=UU(NNNN,M,J)
00132     23*     C
00134     24*           RETURN
00135     25*           END
00135     26*     C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:45

SUBROUTINE WALL ENTRY POINT 000042

STORAGE USED: CODE(1) 000046; DATA(0) 000012; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000042
0005	MAIN3	000010
0006	MAIN5	000550
0007	THERM1	014710
0010	CONR2	000023
0011	DIFF1	042300

EXTERNAL REFERENCES (BLOCK, NAME)

0012 NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000026	1L	0001	000010	115G	0001	000027	2L	0007	004230	A	0004	000000	ACH
0005	000005	AIN	0004	000037	ANGLE	0004	000041	BETA	0006	000346	BXI	0004	000013	DNU
0004	000016	DNU2	0004	000014	DT	0004	000012	DXI	0004	000017	DXINU	0004	000015	DXI2
0005 R	000003	EIN	0004	000034	ELL	0004	000025	EPS	0004	000030	ERR	0004	000006	GA
0004	000002	GAMMA	0004	000007	GB	0004	000010	GC	0004	000011	GD	0004	000040	GE
0005	000004	HIN	0004	000033	HST	0010	000000	H1	0010	000013	H1NU	0010	000015	H1XI
0010	000003	H12	0010	000006	H123	0010	000001	H2	0010	000016	H2NU	0010	000014	H2XI
0010	000004	H23	0010	000002	H3	0010	000020	H3NU	0010	000017	H3XI	0010	000021	H3XINU
0010	000022	H3XIXI	0010	000005	H31	0003	000012	I	0000	000001	INJPS	0003	000013	J
0003	000006	JA	0003	000021	JC	0003	000014	K	0003	000007	KA	0003	000017	LB
0003	000020	LE	0003 I	000010	M	0003	000000	MA	0003 I	000004	MC	0003	000002	MCM
0003	000015	M1	0003	000011	N	0003	000001	NA	0003 I	000005	NC	0003	000003	NCM
0006 R	000024	NU	0003	000016	N1	0007	000000	P	0005 R	000000	PIN	0004	000004	PR
0004	000021	RANGE	0004 R	000003	RE	0005 R	000001	RIN	0006	000202	S	0004	000022	SMIN
0006	000226	SN	0006	000372	SQEZ	0006	000252	ST	0004	000005	STAB	0006	000276	STN
0006	000322	SXI	0007	010460	T	0004	000020	TIME	0005	000002	TIN	0004 R	000036	TW
0011	000000	U	0005	000006	UIN	0011 R	021140	UN	0004	000001	U0	0010	000007	U1
0010	000010	U2	0010	000011	U3	0010	000012	U4	0005	000007	VIN	0006	000000	XI
0004	000035	XIMAX	0004	000024	Y0	0004	000023	Z0						

```
00101     1*          SUBROUTINE WALL
00101     2*     C
00103     3*          PARAMETER MM=20,NN=110,JJ=4
00104     4*          REAL NU
00105     5*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,N1,N1,LB,LE,JC
00106     6*          COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106     7*         1            NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
```

```
00106      8*          2              ,XIMAX,TW,ANGLE,GE,BETA
00107      9*           COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,GIN,VIN
00110     10*           COMMON/MAIN5/XI(MM),NU(NN),G(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00110     11*          1              RXI(MM),SDEZ(NN)
00111     12*           COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00112     13*           COMMON/COMP2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00112     14*          1              H2NU,H3XI,H3NU,H3XINU,H3XIXI
00113     15*           COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00114     16*           DO 2 M=2,MC
00114     17*      C
00117     18*           IF(RE.GT.1.E8) GO TO 1
00121     19*           UN(NC,M,2)=0.
00122     20*           UN(NC,M,3)=0.
00123     21*           UN(NC,M,4)=UN(NC,M,1)*TW*EIN/PIN*RIN
00124     22*           GO TO 2
00125     23*         1 CONTINUE
00126     24*           UN(NC,M,3)=0.
00127     25*         2 CONTINUE
00127     26*      C
00131     27*           RETURN
00132  *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00132     28*           END

      END OF COMPILATION!          1 DIAGNOSTICS.
```

```
@ FOR SHOCK,SHOCK                                                    20 AUG 72          20:40:46.220
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:46

    SUBROUTINE SHOCK     ENTRY POINT 000516

    STORAGE USED: CODE(1) 000526; DATA(0) 000053; BLANK COMMON(2) 00000)

     COMMON BLOCKS:

     0003   MAIN1  000022
     0004   MAIN2  000042
     0005   MAIN3  000010
     0006   MAIN5  000550
     0007   DIFF1  042300
     0010   BODY1  000120
     0011   SHOCK1 000120
     0012   REGIN1 014710

    EXTERNAL REFERENCES (BLOCK, NAME)

     0013   RANKIN
     0014   REGION
     0015   ATAN
     0016   SQRT
     0017   COS
     0020   SIN
     0021   NERR2$
     0022   NWDU$
     0023   NIO2$
     0024   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0000   000025 100F      0001   000005 117G      0001   000377 210G      0001   000406 215G      0001   000437 226G
     0001   000463 237G      0001   000327 26L       0001   000267 28L       0001   000275 29L       0001   000122 30L
     0000 R 000020 AB        0004   000000 ACH       0005   000005 AIN       0004   000037 ANGLE     0004   000041 BETA
     0006   000346 BXI       0010   000074 CURV      0004   000013 DNU       0004   000016 DNU2      0004 R 000014 DT
     0004 R 000012 DXI       0004   000017 DXINU     0004   000015 DXI2      0005 R 000003 EIN       0004   000034 ELL
     0004 R 000025 EPS       0004 R 000030 ERR       0004   000006 GA        0004   000002 GAMMA     0004   000007 GB
     0004   000010 GC        0004   000011 GD        0004   000040 GE        0012 R 000000 HH1       0012 R 004230 HH2
     0012   010460 HH3       0005 R 000004 HIN       0004   000033 HST       0003   000012 I         0000   000034 INJP$
     0003   000013 J         0003   000006 JA        0003   000021 JC        0003 I 000014 K         0003   000007 KA
     0000 I 000011 KIP       0003   000017 LB        0003   000020 LE        0003 I 000010 M         0003   000000 MA
     0003 I 000004 MC        0003 I 000002 MCM       0000 I 000012 ME        0003   000015 M1        0003   000011 N
     0003   000001 NA        0003   000005 NC        0003   000003 NCM       0006 R 000024 NU        0003   000016 N1
     0010 R 000050 PHI       0005 R 000000 PIN       0004   000004 PR        0000 R 000017 PS        0011 R 000074 PSI
     0004   000021 RANGE     0004   000003 RE        0005 R 000001 RIN       0000 R 000016 RS        0006 R 000202 S
     0004   000022 SMIN      0006 R 000226 SN        0006   000372 SQEZ      0006 R 000252 ST        0004   000005 STAB
     0006 R 000276 STN       0006 R 000322 SXI       0000 R 000003 THE       0004   000020 TIME      0005   000002 TIN
     0000 R 000021 TS        0004   000036 TW        0007   000000 U         0005 R 000006 UIN       0007 R 021140 UN
     0000 R 000022 US        0000 R 000024 UWS       0000 R 000010 UWSA      0004 R 000001 UO        0000 R 000004 U1
     0000 R 000005 U2        0000 R 000006 U3        0000 R 000007 U4        0000 R 000015 VCART     0005 R 000007 VIN
     0000 R 000013 VNINR     0000 R 000014 VNINRO    0000 R 000023 VS        0000 R 000000 WSHA      0006   000000 XI
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0004   000035 XIMAX      0010 R 000000 YB         0011 R 000000 YS         0004   000024 YO         0010 R 000024 ZB
0011 R 000024 ZS         0011   000050 ZSY        0004   000023 ZO
```

```
00101      1*            SUBROUTINE SHOCK
00101      2*      C
00103      3*            PARAMETER MM=20,NN=110,JJ=4
00104      4*            REAL NU
00105      5*            DIMENSION WSHA(3)
00106      6*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      7*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00107      8*           1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00107      9*           2             ,XIMAX,TW,ANGLE,GE,BETA
00110     10*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00111     11*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00111     12*           1              BXI(MM),SDEZ(NN)
00112     13*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00113     14*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00114     15*            COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115     16*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00115     17*      C
00115     18*      C
00116     19*            DO 1 M=2,MC
00116     20*      C     DEFINE THE ANGLE BETWEEN THE SHOCK TANGENT AND THE DECREASING
00116     21*      C     Z-AXIS
00116     22*      C
00121     23*            PSI(M)=ATAN(SXI(M))
00122     24*            THE=PSI(M)+PHI(M)
00122     25*      C
00123     26*            UIN=U0*COS(THE)/SQRT(PIN/RIN)
00124     27*            VIN=U0*SIN(THE)/SQRT(PIN/RIN)
00125     28*            U1=UN(2,M,1)/S(M)/HH1(2,M)/HH2(2,M)
00126     29*            U2=UN(2,M,2)/UN(2,M,1)
00127     30*            U3=UN(2,M,3)/UN(2,M,1)
00130     31*            U4=UN(2,M,4)/UN(2,M,1)
00131     32*            UWSA=U4
00132     33*            UWSA=U4-0.5*(U2**2.+U3**2.)
00133     34*            UWSA=U2*SIN(PSI(M))-U3*COS(PSI(M))
00134     35*            KIP=1
00135     36*            ME=1
00136     37*            WSHA(ME)=ST(M)
00137     38*       30   VNINR=VIN+WSHA(ME)*COS(PSI(M))
00140     39*            VNINRD=VNINR*SQRT(PIN/RIN)
00141     40*            CALL RANKIN(VNINRD,VCART,RS,PS,AB,TS)
00142     41*            US=UIN
00143     42*            VS=VCART-WSHA(ME)*COS(PSI(M))
00144     43*            U2=US*COS(PSI(M))+VS*SIN(PSI(M))
00145     44*            U3=US*SIN(PSI(M))-VS*COS(PSI(M))
00146     45*            UWS=TS*EIN/PIN*RIN+0.5*(U2**2.+U3**2.)
00147     46*            UWS=TS*EIN/PIN*RIN
00150     47*            UWS=VS
00151     48*            STN(M)=WSHA(ME)
00152     49*            ERR(ME)=UWSA-UWS
00153     50*            IF(ABS(ERR(ME)/UWSA)-EPS(1))26,26,27
00156     51*       27   GO TO (28,29,30),ME
00157     52*       28   ME=2
```

```
00160     53*            WSHA(2)=WSHA(1)-EPS(2)
00161     54*            GO TO 30
00162     55*         29 STN(M)=WSHA(1)-ERR(1)*(WSHA(2)-WSHA(1))/(ERR(2)-ERR(1))
00163     56*            WSHA(1)=WSHA(2)
00164     57*            ERR(1)=ERR(2)
00165     58*            WSHA(2)=STN(M)
00166     59*            KIP=KIP+1
00167     60*            IF(KIP-20)30,30,31
00172     61*         31 WRITE(6,100)M,K
00176     62*        100 FORMAT(  )
00177     63*         26 CONTINUE
00177     64*      C
00200     65*            UN(2,M,1)=RS
00201     66*            UN(2,M,2)=U2
00202     67*            UN(2,M,3)=U3
00203     68*            UN(2,M,4)=HIN/PIN*RIN**.5*(1.+1./RS)*(PS-1.)-PS/RS+.5*(U2**2+U3**2)
00203     69*      C
00204     70*         1  CONTINUE
00204     71*      C
00204     72*      C     COMPUT NEW SHOCK POINTS
00204     73*      C
00204     74*      C
00206     75*            STN(1)=STN(3)
00207     76*            DO 40 M=1,MC
00212     77*         40 SN(M)=S(M)+STN(M)*DT
00212     78*      C
00212     79*      C
00214     80*            DO 55 M=1,MC
00217     81*            S(M)=SN(M)
00220     82*            ST(M)=STN(M)
00221     83*            YS(M)=YB(M)+S(M)*COS(PHI(M))
00222     84*            ZS(M)=ZB(M)+S(M)*SIN(PHI(M))
00223     85*         55 CONTINUE
00225     86*            DO 42 M=2,MCM
00230     87*         42 SXI(M)=(SN(M+1)-SN(M-1))/2./DXI
00232     88*            SXI(MC)=(SN(MC)-SN(MCM))/DXI
00233     89*            SXI(1)=-SXI(3)
00234     90*            SXI(2)=0.
00234     91*      C
00235     92*            CALL REGION
00236     93*
00236     94*            DO 8 M=2,MC
00241     95*            UN(2,M,1)=HH1(2,M)*HH2(2,M)*S(M)*UN(2,M,1)
00242     96*            UN(2,M,2)=UN(2,M,1)*UN(2,M,2)
00243     97*            UN(2,M,3)=UN(2,M,1)*UN(2,M,3)
00244     98*            UN(2,M,4)=UN(2,M,1)*UN(2,M,4)
00245     99*         8  CONTINUE
00245    100*      C
00247    101*            RETURN
00250    102*            END
00250    103*      C

        END OF COMPILATION:       NO  DIAGNOSTICS.
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```
@ FOR RANKIN,RANKIN                                                    20 AUG 72          20:40:48.525
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:48


    SUBROUTINE RANKIN    ENTRY POINT 000145


    STORAGE USED: CODE(1) 000172; DATA(0) 000032; BLANK COMMON(2) 000001

     COMMON BLOCKS:

     0003   MAIN1  000022
     0004   MAIN2  000042
     0005   MAIN3  000010


    EXTERNAL REFERENCES (BLOCK, NAME)

     0006   THERM
     0007   SQRT
     0010   NWDU$
     0011   NIO2$
     0012   NERR3$


    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001   000117 402L      0001   000027 404L      0001   000112 405L      0000   000007 407F      0004   000000 ACH
     0005 R 000005 AIN       0000 R 000001 AMIN      0004   000037 ANGLE     0004   000041 BETA      0004   000013 DNU
     0004   000016 DNU2      0004   000014 DT        0004   000012 DXI       0004   000017 DXINU     0004   000015 DXI2
     0005   000003 EIN       0004   000034 ELL       0004   000025 EPS       0004   000030 ERR       0000 R 000005 ES
     0004   000006 GA        0004   000002 GAMMA     0004   000007 GB        0004   000010 GC        0004 R 000011 GD
     0004 R 000040 GE        0005 R 000004 HIN       0000 R 000004 HS        0004   000033 HST       0003   000012 I
     0000   000023 INJP$     0003   000013 J         0003   000006 JA        0003   000021 JC        0003   000014 K
     0003   000007 KA        0000 I 000002 KIM       0003   000017 LB        0003   000020 LE        0003   000010 M
     0003   000000 MA        0003   000004 MC        0003   000002 MCM       0003   000015 M1        0003   000011 N
     0003   000001 NA        0003   000005 NC        0003   000003 NCM       0003   000016 N1        0005 R 000000 PIN
     0004   000004 PR        0004   000021 RANGE     0004   000003 RE        0005 R 000001 RIN       0000 R 000003 RORIN
     0000 R 000006 RSD       0004   000022 SMIN      0004   000005 STAB      0004   000020 TIME      0005   000002 TIN
     0004   000036 TW        0005   000006 UIN       0000 R 000000 UNIN      0004   000001 U0        0005   000007 VIN
     0004   000035 XIMAX     0004   000024 Y0        0004   000023 Z0


00101      1*            SUBROUTINE RANKIN(UN,UCART,RS,PS,AS,TS)
00101      2*      C
00103      3*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00104      4*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00104      5*           1            NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00104      6*           2           ,XIMAX,TW,ANGLE,GE,BETA
00105      7*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00105      8*      C
00106      9*            UNIN=UN/SQRT(PIN/RIN)
00107     10*            AMIN=UNIN**2./(AIN**2,/(PIN/RIN))
00110     11*            KIM=1
00111     12*            RORIN=GE*AMIN/(1,+GD*AMIN)
```

```
00112     13*        404 PS=1.+(1.+1./RORIN)*UNIN**2.
00113     14*            HS=HIN/PIN*RIN+.5*(1.+1./RORIN)*(PS-1.)
00114     15*            ES=HS-PS/RORIN
00115     16*            CALL THERM(2,RORIN,ES,TS)
00116     17*            RSD=PS/TS*RIN
00117     18*            IF(ABS(RSD-RORIN*RIN)/RSD-.0001)402,402,403
00122     19*        403 KIN=KIN+1
00123     20*            IF(KIN-20)406,406,405
00126     21*        406 RORIN=RSD/RIN
00127     22*            GO TO 404
00130     23*        405 WRITE(6,407)
00132     24*        407 FORMAT(///27HERROR IN MAIN SHOCK DENSITY)
00133     25*        402 CONTINUE
00134     26*            CALL THERM(3,RORIN,ES,AS)
00135     27*            RS=RORIN
00136     28*            UCART=UNIN/RS
00137     29*            RS=ABS(RS)
00140     30*            PS=ABS(PS)
00140     31*      C
00141     32*            RETURN
00142     33*            END
00142     34*      C
```

END OF COMPILATION: NO DIAGNOSTICS.

SUBROUTINE STRESS ENTRY POINT 000474

STORAGE USED: CODE(1) 000503; DATA(0) 000052; BLANK COMMON(2) 000001

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000042
0005	MAIN5	000550
0006	DIFF1	042300
0007	CONR2	000023
0010	REGIN1	014710
0011	THERM1	014710
0012	STRES1	000005

EXTERNAL REFERENCES (BLOCK, NAME)

0013	NEXP6$
0014	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0011	004230	A	0004	R	000000	ACH	0004	000037	ANGLE	0000	R	000014	AP1	0004	000041	BETA	
0005	R 000346	BXI	0004	R	000013	DNU	0004	000016	DNU2	0004		000014	DT	0004	R 000012	DXI	
0004	000017	DXINU	0004		000015	DX12	0004	000034	ELL	0004		000025	EPS	0004	000030	ERR	
0000	R 000015	E11	0000	R	000020	E12	0000	R 000021	E21	0000	R	000016	E22	0000	R 000017	E33	
0004	000006	GA	0004	R	000002	GAMMA	0004	000007	GB	0004		000010	GC	0004	000011	GD	
0004	000040	GE	0010	R	000000	HH1	0010	R 004230	HH2	0010		010460	HH3	0004	000033	HST	
0007	R 000000	H1	0007	R	000013	H1NU	0007	000015	H1XI	0007	R	000003	H12	0007	000006	H123	
0007	R 000001	H2	0007	R	000016	H2NU	0007	R 000014	H2XI	0007		000004	H23	0007	R 000002	H3	
0007	R 000020	H3NU	0007	R	000017	H3XI	0007	R 000021	H3XINU	0007		000022	H3XIXI	0007	000005	H31	
0003	000012	I	0000	I	000003	II	0000	I 000004	III	0000		000030	INJPS	0003	000013	J	
0003	000006	JA	0003		000021	JC	0003	000014	K	0003		000007	KA	0003	I 000017	LB	
0003	000020	LE	0000	I	000001	M	0003	000000	MA	0003	I	000004	MC	0003	000002	MCM	
0003	000015	M1	0000	I	000000	N	0003	000001	NA	0003	I	000005	NC	0003	000003	NCM	
0005	R 000024	NU	0003		000016	N1	0011	R 000000	P	0012	R	000000	P111	0012	R 000001	P112	
0012	R 000002	P121	0012	R	000003	P122	0012	R 000004	P133	0004		000004	PR	0004	000021	RANGE	
0004	R 000003	RE	0000	R	000013	REVAR1	0000	R 000002	RR	0005	R	000202	S	0004	000022	SMIN	
0005	000226	SN	0005	R	000372	SQE2	0005	000252	ST	0004		000005	STAB	0005	000276	STN	
0005	R 000322	SX1	0011	R	010460	T	0004	000020	TIME	0004		000036	TW	0006	R 000000	U	
0006	021140	UN	0000	R	000005	UNU	0000	R 000007	UOH1NU	0000	R	000011	UX1	0004	000001	U0	
0007	000007	U1	0007	R	000010	U2	0007	R 000011	U3	0007		000012	U4	0000	R 000006	VNU	
0000	R 000010	VOH2NU	0000	R	000012	VOH2X1	0003	000010	X	0005		000000	X1	0004	000035	XIMAX	
0003	000011	Y	0004		000024	Y0	0004	000023	Z0								

```
00101      1*          SUBROUTINE STRESS(ND,MD)
00101      2*     C
```

```
00103      3*            PARAMETER MM=20,NN=110,JJ=4
00104      4*            REAL NU
00105      5*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,X,Y,I,J,K,N1,N1,LB,LE,JC
00106      6*            COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106      7*           1             NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00106      8*           2             ,XIMAX,TW,ANGLE,GE,BETA
00107      9*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00107     10*           1              BXI(MM),SQEZ(NN)
00110     11*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00111     12*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00111     13*           1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00112     14*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00113     15*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00114     16*            COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00114     17*      C
00115     18*            N=NC
00116     19*            M=MD
00117     20*            RR=((1.-NU(N))*SXI(M)+BXI(M))/S(M)
00120     21*            II=0
00120     22*      C
00121     23*            III=II
00122     24*            IF(N.EQ.2) II=1
00124     25*            IF(N.EQ.NC) II=-1
00126     26*            UNU=((II-1)*U(N-1,M,2)/J(N-1,M,1)-2*II*U(N,M,2)/U(N,M,1)
00126     27*           1     +(II+1)*U(N+1,M,2)/U(N+1,M,1))/2./DNU
00127     28*            VNU=((II-1)*U(N-1,M,3)/J(N-1,M,1)-2*II*U(N,M,3)/U(N,M,1)
00127     29*           1     +(II+1)*U(N+1,M,3)/U(N+1,M,1))/2./DNU
00130     30*            UOH1NU=((II-1)*U(N-1,M,2)/U(N-1,M,1)/HH1(N-1,M)-2*II*U(N,M,2)/
00130     31*           1     U(N,M,1)/HH1(N,M)+(II+1)*U(N+1,M,2)/U(N+1,M,1)/HH1(N+1,M))/2.
00130     32*           2     /DNU
00131     33*            VOH2NU=((II-1)*U(N-1,M,3)/U(N-1,M,1)/HH2(N-1,M)-2*II*U(N,M,3)/
00131     34*           1     U(N,M,1)/HH2(N,M)+(II+1)*U(N+1,M,3)/U(N+1,M,1)/HH2(N+1,M))/2.
00131     35*           2     /DNU
00132     36*            UNU=UNU*SQEZ(N)
00133     37*            VNU=VNU*SQEZ(N)
00134     38*            UOH1NU=UOH1NU*SQEZ(N)
00135     39*            VOH2NU=VOH2NU*SQEZ(N)
00136     40*            II=III
00136     41*      C
00137     42*            III=II
00140     43*            IF(M.EQ.1)M=3
00142     44*            IF(M.EQ.MC)II=-1
00144     45*            UXI=((II-1)*U(N,M-1,2)/J(N,M-1,1)-2*II*U(N,M,2)/U(N,M,1)
00144     46*           1     +(II+1)*U(N,M+1,2)/U(N,M+1,1))/2./DXI
00145     47*            VOH2XI=((II-1)*U(N,M-1,3)/U(N,M-1,1)/HH2(N,M-1)-2*II*U(N,M,3)/
00145     48*           1     U(N,M,1)/HH2(N,M)+(II+1)*U(N,M+1,3)/U(N,M+1,1)/HH2(N,M+1))/
00145     49*           2     2./DXI
00146     50*            II=III
00146     51*      C
00147     52*            REVARI=RE*(T(N,M)+0.5)/1.5/T(N,M)**1.5
00150     53*            AP1=GAMMA**0.5*ACH/REVARI
00151     54*            E11=2.*AP1*((UXI+RR*UNU)/H1+U3/H12*H1NU*(-1./S(M)))
00152     55*            E22=2.*AP1*((-1./S(M))*VNU/H2+U2/H12*(H2XI+RR*H2NU))
00153     56*            E33=2.*AP1*((H3XI+RR*H3NU)/H1/H3*U2+(-1./S(M))*H3NU/H2/H3*U3)
00154     57*            IF(LB.EQ.1.AND.M.EQ.2)E33=2.*AP1*((UXI+RR*UNU)/H1 +U3/H2*(-1./S(M)
00154     58*           1     )*H3XINU/H3XI)
00156     59*            E12=AP1*(H2/H1*(VOH2XI+RR*VOH2NU)+H1/H2*(-1./S(M))*UOH1NU)
00157     60*            E21=E12
```

```
00157      61*      C
00160      62*           PI11=P(N,M)-E11+1./3.*(E11+E22+E33)
00161      63*           PI22=P(N,M)-E22+1./3.*(E11+E22+E33)
00162      64*           PI33=P(N,M)-E33+1./3.*(E11+E22+E33)
00163      65*           PI12=-E12
00164      66*           PI21=-E21
00164      67*      C
00164      68*      C
00165      69*         1 CONTINUE
00166      70*           RETURN
00167      71*           END
00167      72*      C
```

END OF COMPILATION: NO DIAGNOSTICS.

```
@ FOR HEAT,HEAT                                                    20 AUG 72          20:40:52.350
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E120100104)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:52


    SUBROUTINE HEAT      ENTRY POINT 000220


    STORAGE USED: CODE(1) 000225; DATA(0) 000027; BLANK COMMON(2) 00000


     COMMON BLOCKS:

     0003   MAIN1  000022
     0004   MAIN2  000042
     0005   MAIN5  000550
     0006   THERM1 014710
     0007   CONR2  000023
     0010   HEAT1  000002


    EXTERNAL REFERENCES (BLOCK, NAME)

     0011   NEXP6$
     0012   NERR3$


    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0006   004230 A        0004 R 000000 ACH      0004   000037 ANGLE    0000 R 000007 AP2      0004   000041 BETA
     0005 R 000346 BXI      0004 R 000013 DNU      0004   000016 DNU2     0004   000014 DT       0004 R 000012 DXI
     0004   000017 DXINU    0004   000015 DXI2     0004   000034 ELL      0004   000025 EPS      0004   000030 ERR
     0004   000006 GA       0004 R 000002 GAMMA    0004   000007 GB       0004   000010 GC       0004   000011 GD
     0004   000040 GE       0004   000033 HST      0007 R 000000 H1       0007   000013 H1NU     0007   000015 H1XI
     0007   000003 H12      0007   000006 H123     0007 R 000001 H2       0007   000016 H2NU     0007   000014 H2XI
     0007   000004 H23      0007   000002 H3       0007   000020 H3NU     0007   000017 H3XI     0007   000021 H3XINU
     0007   000022 H3XIXI   0007   000005 H31      0003   000012 I        0000 I 000002 II       0000 I 000003 III
     0000   000014 INJP$    0003   000013 J        0003   000006 JA       0003   000021 JC       0003   000014 K
     0003   000007 KA       0003   000017 LB       0003   000020 LE       0000 I 000001 M        0003   000000 MA
     0003 I 000004 MC       0003   000002 MCM      0003   000015 M1       0000 I 000000 N        0003   000001 NA
     0003 I 000005 NC       0003   000003 NCM      0005 R 000024 NU       0003   000016 N1       0006   000000 P
     0004 R 000004 PR       0000 R 000005 QQ1      0000 R 000004 QQ2      0010 R 000000 Q1       0010 R 000001 Q2
     0004   000021 RANGE    0004 R 000003 RE       0000 R 000006 REVARI   0005 R 000202 S        0004   000022 SMIN
     0005   000226 SN       0005 R 000372 SQEZ     0005   000252 ST       0004   000005 STAB     0005   000276 STN
     0005 R 000322 SXI      0006 R 010460 T        0004   000020 TIME     0004   000036 TW       0004   000001 U0
     0007   000007 U1       0007   000010 U2       0007   000011 U3       0007   000012 U4       0003   000010 X
     0005   000000 XI       0004   000035 XIMAX    0003   000011 Y        0004   000024 Y0       0004   000023 Z0


  00101      1*            SUBROUTINE HEAT(ND,MD)
  00101      2*      C
  00103      3*            PARAMETER MM=20,NN=110,JJ=4
  00104      4*            REAL NU
  00105      5*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,X,Y,I,J,K,M1,N1,LB,LE,JC
  00106      6*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
  00106      7*           1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
  00106      8*           2             ,XIMAX,TW,ANGLE,GE,BETA
```

```
00107      9*            COMMON/MAIN5/XI(MM),ND(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00107     10*           1             BXI(MM),SQEZ(NN)
00110     11*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00111     12*
00111     13*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00111     14*           1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00112     15*            COMMON/HEAT1/Q1,Q2
00112     16*      C
00113     17*            N=ND
00114     18*            M=MD
00115     19*            II=0
00115     20*      C
00116     21*            III=II
00117     22*            IF(N.EQ.NC) II=-1
00121     23*            IF(N.EQ.2) II=1
00123     24*            GQ2=((II-1)*T(N-1,M)-2*II*T(N,M)+(II+1)*T(N+1,M))/2./DNU
00124     25*            GQ2=GQ2*SQEZ(N)
00125     26*            II=III
00125     27*      C
00126     28*            III=II
00127     29*            IF(M.EQ.1)M=3
00131     30*            IF(M.EQ.MC)II=-1
00133     31*            GQ1=((II-1)*T(N,M-1)-2*II*T(N,M)+(II+1)*T(N,M+1))/2./DXI
00134     32*            II=III
00134     33*      C
00134     34*      C
00135     35*            REVARI=RE*(T(N,M)+0.5)/1.5/T(N,M)**1.5
00136     36*            AP2=GAMMA**1.5*ACH/(GAMMA-1.)/PR/REVARI
00137     37*            Q2=-AP2*GQ2*(-1.)/S(M)/H2
00140     38*            Q1=-AP2*(GQ1+((1.-NU(N))*SXI(M)*BXI(M))/S(M)*GQ2)/H1
00140     39*      C
00141     40*        1   CONTINUE
00141     41*      C
00142     42*            RETURN
00143     43*            END
00143     44*      C
```

REVAR1 = RC

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END OF COMPILATION: NO DIAGNOSTICS.

PRINTED IN U.S.A.

FORM 1311-3

```
@ FOR CONVR2,CONVR2                                          20 AUG 72          20:40:53.941
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:54

    SUBROUTINE CONVR2    ENTRY POINT 000217

    STORAGE USED: CODE(1) 000235; DATA(0) 000027; BLANK COMMON(2) 00000

     COMMON BLOCKS:

     0003   MAIN1  000022
     0004   MAIN2  000042
     0005   MAIN5  000550
     0006   REGIN1 014710
     0007   DIFF1  042300
     0010   CONR2  000023
     0011   BODY1  000120

    EXTERNAL REFERENCES (BLOCK, NAME)

     0012   COS
     0013   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0004   000000 ACH      0004   000037 ANGLE    0004   000041 BETA     0005   000346 BXI      0011 R 000074 CURV
     0004   000013 DNU      0004   000016 DNU2     0004   000014 DT       0004 R 000012 DXI      0004   000017 DXINU
     0004   000015 DXI2     0004   000034 ELL      0004   000025 EPS      0004   000030 ERR      0004   000006 GA
     0004   000002 GAMMA    0004   000007 GB       0004   000010 GC       0004   000011 GD       0004   000040 GE
     0006 R 000000 HH1      0006 R 004230 HH2      0006 R 010460 HH3      0004   000033 HST      0010 R 000000 H1
     0010 R 000013 H1NU     0010 R 000015 H1XI     0010 R 000003 H12      0010 R 000006 H123     0010 R 000001 H2
     0010 R 000016 H2NU     0010 R 000014 H2XI     0010 R 000004 H23      0010 R 000002 H3       0010 R 000020 H3NU
     0010 R 000017 H3XI     0010 R 000021 H3XINU   0010 R 000022 H3XIXI   0010 R 000005 H31      0003   000012 I
     0000   000001 INJP$    0003   000013 J        0003   000006 JA       0003   000021 JC       0003   000014 K
     0003   000007 KA       0003 I 000017 LB       0003   000020 LE       0003   000000 MA       0003 I 000004 MC
     0003 I 000002 MCM      0003   000015 M1       0003   000001 NA       0003   000005 NC       0003   000003 NCM
     0005 R 000024 NU       0003   000016 N1       0011 R 000050 PHI      0004   000004 PR       0004   000021 RANGE
     0004   000003 RE       0005 R 000202 S        0004   000022 SMIN     0005   000226 SN       0005 R 000372 SQEZ
     0005   000252 ST       0004   000005 STAB     0005   000276 STN      0005   000322 SXI      0004   000020 TIME
     0004   000036 TW       0007 R 000000 U        0007   021140 UN       0004   000001 U0       0010 R 000007 U1
     0010 R 000010 U2       0010 R 000011 U3       0010 R 000012 U4       0003   000010 X        0005   000000 XI
     0004   000035 XIMAX    0003   000011 Y        0011   000000 YB       0004   000024 Y0       0011   000024 Z8
     0004   000023 Z0

00101      1*            SUBROUTINE CONVR2(N,M)
00103      2*            PARAMETER MM=20,NN=110,JJ=4
00104      3*            REAL NU
00105      4*            COMMON/MAIN1/MA,NA,NCM,NCM,MC,NC,JA,KA,X,Y,I,J,K,M1,N1,LB,LE,JC
00106      5*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106      6*           1            NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00106      7*           2            ,XIMAX,TW,ANGLE,GE,BETA
```

```
00107      8*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00107      9*           1            BXI(MM),SQEZ(NN)
00110     10*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00111     11*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00112     12*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00112     13*           1            H2NU,H3XI,H3NU,H3XINU,H3XIXI
00113     14*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00113     15*      C
00113     16*      C
00114     17*            H1=HH1(N,M)
00115     18*            H2=HH2(N,M)
00116     19*            H3=HH3(N,M)
00117     20*            H12=H1*H2
00120     21*            H23=H2
00121     22*            H31=H1
00121     23*      C
00122     24*            H123=H1*H2
00122     25*      C
00122     26*      C     U1=RHO,U2=U,U3=V,U4=E*D,5*Q**2,
00123     27*            U1=U(N,M,1)/H123/S(M)
00124     28*            U2=U(N,M,2)/U(N,M,1)
00125     29*            U3=U(N,M,3)/U(N,M,1)
00126     30*            U4=U(N,M,4)/U(N,M,1)
00126     31*      C
00126     32*      C
00126     33*      C     EASIER TO CALCULATE H1XI AND H3XI THIS WAY
00127     34*            H1XI=(HH1(N,M+1)-HH1(N,M-1))/2./DXI
00130     35*            IF(M.EQ.MC)H1XI=(HH1(N,MC)-HH1(N,MCM))/DXI
00132     36*            H1NU=-CURV(M)*S(M)
00133     37*            H1NU=H1NU*SQEZ(N)
00134     38*            H2XI=0.
00135     39*            H2NU=0.
00136     40*            H3XI=(HH3(N,M+1)-HH3(N,M-1))/2./DXI*LB
00137     41*            IF(M.EQ.1)H3XI=(HH3(N,4)-HH3(N,2))/2./DXI*LB
00141     42*            IF(M.EQ.MC)H3XI=(HH3(N,MC)-HH3(N,MCM))/DXI*LB
00143     43*            H3NU=-S(M)*COS(PHI(M))*LB
00144     44*            IF(M.EQ.1)H3NU=S(1)*COS(PHI(1))*LB
00146     45*            H3NU=H3NU*SQEZ(N)
00147     46*            H3XIXI=0.
00150     47*            H3XINU=-S(M)*LB
00151     48*            H3XINU=H3XINU*SQEZ(N)
00151     49*      C
00151     50*      C
00152     51*            RETURN
00153     52*            END
00153     53*      C

       END OF COMPILATION:       NO  DIAGNOSTICS.
```

UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:55

SUBROUTINE THERM ENTRY POINT 000107

STORAGE USED: CODE(1) 000116; DATA(0) 000021; BLANK COMMON(2) 000007

COMMON BLOCKS:

0003	MAIN3	000010
0004	CONR2	000023

EXTERNAL REFERENCES (BLOCK, NAME)

0005	GAMAR
0006	NERR2$
0007	SQRT
0010	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000100	I01L	0001	000032	I01L	0001	000042	I02L	0001	000052	I03L
0003	000005	AIN	0003	000003	EIN	0000 R	000001	EOEIN	0005 R	000000	GAMAR
0003	000004	HIN	0000 R	000010	HOHIN	0004	000000	H1	0004	000013	H1NU
0004	000003	H12	0004	000006	H123	0004	000001	H2	0004	000016	H2NU
0004	000004	H23	0004	000002	H3	0004	000020	H3NU	0004	000017	H3XI
0004	000022	H3XIXI	0004	000005	H31	0000	000013	INJP$	0000 I	000000	NN
0000 R	000005	POPIN	0000 R	000004	R	0003 R	000001	RIN	0000 R	000002	RORIN
0003 R	000002	TIN	0000 R	000006	TOTIN	0003	000006	UIN	0004	000007	U1
0004	000011	U3	0004	000012	U4	0003	000007	VIN			

0001	000071	I04L									
0000 R	000003	GAMMA									
0004	000015	H1XI									
0004	000014	H2XI									
0004	000021	H3XINU									
0003 R	000000	PIN									
0000 R	000007	SOUND									
0004	000010	U2									

```
00101      1*          SUBROUTINE THERM(N,X,Y,STOR)
00101      2*     C    DEFINE OTHER THERMODYNAMIC PROPERTIES
00101      3*     C
00103      4*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00104      5*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00104      6*         1            H2NU,H3XI,H3NU,H3XINU,H3XIXI
00104      7*     C
00104      8*     C
00105      9*          NN=N
00106     10*          EOEIN=Y*PIN/RIN
00107     11*          RORIN=X*RIN
00110     12*          GAMMA=GAMAR(RORIN,EOEIN)
00110     13*     C
00111     14*          R=3089.67/1.8
00111     15*     C
00112     16*          GO TO (101,102,103,104),NN
00112     17*     C    PRESSURE
00113     18*      101 POPIN=(GAMMA-1.)*RORIN*EOEIN
00114     19*          STOR=POPIN/PIN
```

```
00115     20*               GO TO 10
00115     21*         C     TEMPERATURE
00116     22*          102  TOTIN=(GAMMA-1.)*EOEIN/R
00117     23*               STOR=TOTIN/TIN
00120     24*               GO TO 10
00120     25*         C     SOUND SPEED
00121     26*          103  SOUND=GAMMA*(GAMMA-1.)*EOEIN
00122     27*               SOUND=ABS(SOUND)
00123     28*               STOR=SQRT(SOUND/PIN*RIN)
00124     29*               GO TO 10
00124     30*         C     ENTHALPY
00125     31*          104  HOHIN=EOEIN*GAMMA
00126     32*               STOR=HOHIN/PIN*RIN
00127     33*               GO TO 10
00127     34*         C
00130     35*           10  RETURN
00131     36*               END
00131     37*         C
00131     38*         C
```

END OF COMPILATION; NO DIAGNOSTICS.

```
@ FOR ACHEMP,ACHEMP                                                    20 AUG 72          20:40:56.750
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXECS LEVEL E120100104)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:56

   SUBROUTINE ACHEM     ENTRY POINT 000306

   STORAGE USED: CODE(1) 000322; DATA(0) 000031; BLANK COMMON(2) 00000

    COMMON BLOCKS:

    0003   MAIN2  000041
    0004   MAIN3  000010

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   EXIT
    0006   NWDU$
    0007   NIO2$
    0010   NERR2$
    0011   ALOG
    0012   EXP
    0013   SQRT
    0014   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000011 10L       0001   000050 100L      0001   000063 101L      0001   000106 102L      0001   000126 103L
    0001   000155 104L      0001   000014 11L       0001   000020 12L       0001   000030 13L       0001   000201 200L
    0001   000225 201L      0001   000251 202L      0001   000256 203L      0001   000220 204L      0001   000273 205L
    0000   000011 9F        0003   000000 ACH       0004   000005 AIN       0003   000037 ANGLE     0003   000013 DNU
    0003   000016 DNU2      0003   000014 DT        0003   000012 DXI       0003   000017 DXINU     0003   000015 DXI2
    0004   000003 EIN       0003   000034 ELL       0003   000025 EPS       0003   000030 ERR       0003 R 000006 GA
    0003 R 000002 GAMMA     0003   000007 GB        0003   000010 GC        0003   000011 GD        0003   000040 GE
    0004   000004 HIN       0003   000033 HST       0000   000023 INJP$     0000 I 000004 L         0000 I 000000 NN
    0000 I 000010 NNN       0004 R 000000 PIN       0000 R 000005 POPIN     0003   000004 PR        0000 R 000003 R
    0003   000021 RANGE     0003   000003 RE        0004 R 000001 RIN       0000 R 000006 RORIN     0000 R 000007 RR
    0003   000022 SMIN      0003   000005 STAB      0003   000020 TIME      0004   000002 TIN       0003   000036 TW
    0004   000006 UIN       0003   000001 U0        0004   000007 VIN       0003   000035 XIMAX     0000 R 000001 XX
    0000 R 000002 YY        0003   000024 Y0        0003   000023 Z0

00101     1*            SUBROUTINE ACHEM(N,X,Y,STOR)
00101     2*       C
00103     3*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00103     4*           1            NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00105     5*           2            ,XIMAX,TW,ANGLE,GE
00104     6*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00104     7*       C
00105     8*            NN=N                                                          092S2308
00106     9*            XX=ABS(X)
00107    10*            YY=ABS(Y)
00110    11*            IF(NN)12,10,11                                                092S2311
```

```
00113    12*        10 RETURN                                                    092S2312
00114    13*        11 IF(NN-20)13,13,12                                         092S2313
00117    14*        12 WRITE(6,9)NN                                              092S2314
00122    15*         9 FORMAT(//1H041x33HCODE FOR AIR CHEMISTRY INCORRECT=I4)    092S2315
00123    16*           CALL EXIT                                                 092S2316
00124    17*        13 R=3089,67/1,8
00125    18*           L=((NN-2)/5+1)
00126    19*           GO TO (100,200),L
00127    20*       100 GO TO(12,101,102,104,103),NN
00130    21*       101 POPIN=XX/PIN                                             092S2321
00131    22*           RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                        092S2322
00132    23*           STOR=GA*XX/(RORIN*RIN)                                   092S2323
00133    24*           GO TO 10                                                 092S2324
00134    25*       102 POPIN=XX/PIN                                             092S2325
00135    26*           RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)
00136    27*           STOR=RORIN*RIN                                           092S2327
00137    28*           GO TO 10                                                 092S2328
00140    29*       103 POPIN=XX/PIN                                             092S2329
00141    30*           RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                        092S2330
00142    31*           STOR=SQRT(GAMMA*XX/(RORIN*RIN))                          092S2331
00143    32*           GO TO 10                                                 092S2332
00144    33*       104 POPIN=XX/PIN
00145    34*           RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                        092S2326
00146    35*           RR=RORIN*RIN
00147    36*           STOR=XX/RR/R
00150    37*           GO TO 10
00151    38*       200 NNN=NN-5                                                 092S2333
00152    39*           GO TO(12,201,202,204,203,205),NNN
00153    40*       204 STOR=YY/GA/R                                             092S2335
00154    41*           GO TO 10                                                 092S2336
00155    42*       201 RR=GA*XX/YY                                              092S2337
00156    43*           RORIN=RR/RIN                                             092S2338
00157    44*           POPIN=XX/PIN                                             092S2339
00160    45*           STOR=ALOG(POPIN)-GAMMA*ALOG(RORIN)                       092S2340
00161    46*           GO TO 10                                                 092S2341
00162    47*       202 STOR=GA*XX/YY                                            092S2342
00163    48*           GO TO 10                                                 092S2343
00164    49*       203 RR=GA*XX/YY                                              092S2344
00165    50*           STOR=SQRT(GAMMA*XX/RR)                                   092S2345
00166    51*           GO TO 10                                                 092S2346
00167    52*       205 STOR=YY/GAMMA
00170    53*           GO TO 10
00171    54*           END
00171    55*     C
```

END OF COMPILATION! NO DIAGNOSTICS.

```
@ FOR GAMA,GAMA                                                    20 AUG 72          20140158.241
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:58

    FUNCTION GAMAR       ENTRY POINT 000011

    STORAGE USED: CODE(1) 000013; DATA(0) 000007; BLANK COMMON(2) 000001

    EXTERNAL REFERENCES (BLOCK, NAME)
      0003   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)
      0000 R 000000 GAMAR     0000   000002 INJP$


191 00101      1*            FUNCTION GAMAR(RHO,EE)
    00103      2*            GAMAR=1.4
    00104      3*            RETURN
    00105      4*            END
    00105      5*      C
    00105      6*      C

        END OF COMPILATION!        NO  DIAGNOSTICS.
```

```
@ FOR GAMAR,GAMAR                                                    20 AUG 72          20:40:59.389
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXECS LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:40:59

    FUNCTION GAMAR       ENTRY POINT 000173

    STORAGE USED: CODE(1) 000175; DATA(0) 000053; BLANK COMMON(2) 00000)

    EXTERNAL REFERENCES (BLOCK, NAME)

      0003   ALOG10
      0004   NEXP6$
      0005   EXP
      0006   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

      0000 R 000017 ALPHA      0000 R 000010 DELE1      0000 R 000011 DELE2      0000 R 000005 E          0000 R 000002 ECON
      0000 R 000006 E1         0000 R 000007 E2         0000 R 000012 F1         0000 R 000013 F2         0000 R 000000 GAMAR
      0000 R 000020 GAMFR1     0000 R 000014 G1         0000 R 000015 G2         0000 R 000016 G3         0000   000044 INJPS
      0000 R 000004 R          0000 R 000001 RCON       0000 R 000003 ROZERO

192
00101      1*              FUNCTION GAMAR(RHO,EE)
00103      2*              DATA RCON,ECON/,516,,932E-7/
00106      3*              DATA ROZERO/1,2E-37/
00106      4*      C
00110      5*              R=RHO/ROZERO*RCON
00111      6*              E=EE*ECON
00112      7*              E1=8,5+,357*ALOG10(R)
00113      8*              E2=45,0*R**0,0157
00114      9*              DELE1=0,975*R**0,05
00115     10*              DELE2=4,0*R**0,085
00115     11*      C
00116     12*              F1=1,/(EXP((E-E1)/DELE1)+1,)
00117     13*              F2=1,/(EXP((-E+E2)/DELE2)+1,)
00117     14*      C
00120     15*              G1=EXP(-E/4,46)
00121     16*              G2=EXP(-E/6,63)
00122     17*              G3=EXP(-E/25,5)
00122     18*      C
00123     19*              ALPHA=0,048*F1*ALOG10(E)+0,032*(1,-F1)*(1,-F2)*ALOG10(E)+0,045*F2
00124     20*              GAMFR1=R**ALPHA*(0,161+0,255*F1*G1+0,28*(1,-F1)*G2+0,137*F2*G3)
00125     21*              GAMAR=GAMFR1+1,
00125     22*      C
00126     23*              RETURN
00127     24*              END
00127     25*      C

        END OF COMPILATION:       NO  DIAGNOSTICS.
```

PRINTED IN U.S.

FORM 1411-3

```
@ FOR ACHEMR,ACHEMR                                                    20 AUG 72          20:41:  0.675
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:41:00

   SUBROUTINE ACHEM     ENTRY POINT 000245

   STORAGE USED: CODE(1) 000261; DATA(0) 000044; BLANK COMMON(2) 00000)

   EXTERNAL REFERENCES (BLOCK, NAME)

     0003   EXIT
     0004   PROPR
     0005   MOLIER
     0006   NWDL$
     0007   NIO2$
     0010   NERR2$
     0011   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001   000063 1L        0001   000236 10L       0001   000040 100L      0001   000020 11L       0001   000010 12L
     0000   000014 19F       0001   000067 2L        0001   000125 200L      0001   000101 3L        0001   000113 4L
     0001   000152 5L        0001   000163 6L        0001   000175 7L        0001   000207 8L        0001   000221 9L
     0000 R 000010 AA        0000 R 000005 HH        0000   000037 INJP$     0000 I 000003 L         0000 I 000002 NN
     0000 I 000011 NNN       0000 R 000004 PND       0000 R 000013 RD        0000 R 000006 RR        0000 R 000012 SR
     0000 R 000007 TT        0000 R 000000 XX        0000 R 000001 YY

  00101      1*          SUBROUTINE ACHEM(N,X,Y,STOR)                                          092S1278
  00103      2*          XX=X                                                                  092S1279
  00104      3*          YY=Y                                                                  092S1280
  00105      4*          NN=N                                                                  092S1281
  00106      5*          IF(NN)12,12,11                                                        092S1282
  00111      6*       12 WRITE(6,19)NN
  00114      7*       19 FORMAT(//1H041X33HCODE FOR AIR CHEMISTRY INCORRECT=I4)              092S1284
  00115      8*          CALL EXIT                                                             092S1285
  00116      9*       11 L=((NN-1)/5+1)                                                     092S1286
  00117     10*          GO TO (100,200,200,12),L
  00120     11*      100 PND=XX/2117.                                                       092S1288
  00121     12*          CALL PROPR(PND,YY,HH)                                                 092S1289
  00122     13*          GO TO (12,1,2,3,4),NN                                                 092S1290
  00123     14*        1 STOR=HH*8475D0.                                                       092S1291
  00124     15*          GO TO 10                                                              092S1292
  00125     16*        2 CALL MOLIER(PND,HH,RR,3)                                              092S1293
  00126     17*          STOR=RR*2,49E-3                                                       092S1294
  00127     18*          GO TO 10                                                              092S1295
  00130     19*        3 CALL MOLIER(PND,HH,TT,4)                                              092S1296
  00131     20*          STOR=TT*491,69
  00132     21*          GO TO 10                                                              092S1298
  00133     22*        4 CALL MOLIER(PND,HH,AA,1)                                              092S1299
  00134     23*          STOR=AA*9,2059E2                                                      092S1300
  00135     24*          GO TO 10                                                              092S1301
```

```
00136     25*        200 NNN=NN-5                                          092S1302
00137     26*            PND=XX/2117.                                      092S1303
00140     27*            HH=YY/847500.                                     092S1304
00141     28*            GO TO (12,5,6,7,8,9),NNN
00142     29*          5 CALL MCLIER(PND,HH,SR,2)                          092S1306
00143     30*            STOR=SR                                           092S1307
00144     31*            GO TO 10                                          092S1308
00145     32*          6 CALL MCLIER(PND,HH,RR,3)                          092S1309
00146     33*            STOR=RR*2,498E-3                                  092S1310
00147     34*            GO TO 10                                          092S1311
00150     35*          7 CALL MCLIER(PND,HH,TT,4)                          092S1312
00151     36*            STOR=TT*491,69
00152     37*            GO TO 10                                          092S1314
00153     38*          8 CALL MCLIER(PND,HH,AA,1)                          092S1315
00154     39*            STOR=AA*9,20598E2                                 092S1316
00155     40*            GO TO 10
00156     41*          9 CALL MCLIER(PND,HH,RR,3)
00157     42*            RD=RR*2,498E-3
00160     43*            STOR=YY-XX/RD
00161     44*         10 RETURN                                            092S1317
00162     45*            END                                               092S1318

      END OF COMPILATION!        NO  DIAGNOSTICS,
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```
@ FOR MOLIER                                                    20 AUG 72          20141: 2.166
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E120100104)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:41:02

    SUBROUTINE MOLIER    ENTRY POINT 000542

    STORAGE USED: CODE(1) 000556; DATA(0) 000162; BLANK COMMON(2) 000001

    EXTERNAL REFERENCES (BLOCK, NAME)

      0003   DUMP
      0004   ALOG
      0005   NERR2$
      0006   EXP
      0007   SQRT
      0010   NWDL$
      0011   NIO2$
      0012   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

      0001   000034 100L      0001   000054 101L      0001   000105 102L      0001   000002 106G      0001   000160 199L
      0001   000165 200L      0001   000204 201L      0001   000253 202L      0001   000343 300L      0001   000452 400L
      0001   000516 500L      0000   000003 502F      0000 R 000046 ART       0000 R 000023 ASMALL     0000 R 000024 BSMALL
      0000 R 000040 CHI       0000 R 000027 CIRH      0000 R 000016 CONA      0000 R 000017 CONB      0000 R 000025 CSMALL
      0000 R 000012 D         0000 R 000026 DSMALL    0000 R 000037 EPS       0000 R 000041 ETA       0000 R 000031 FSMALL
      0000 R 000032 GSMALL    0000   000147 INJP$     0000 I 000001 J         0000 I 000000 N         0000 R 000015 PLOG
      0000 R 000036 RHO       0000 R 000042 SIGMA     0000 R 000033 SMALLM    0000 R 000044 SONIC     0000 R 000020 SR
      0000 R 000002 STOR      0000 R 000034 TAU       0000 R 000030 TAU1      0000 R 000035 TEMP      0000 R 000022 THETA
      0000 R 000021 TSMALL    0000 R 000045 VEL       0000 R 000043 ZETA      0000 R 000035 ZT

00101      1*          SUBROUTINE MOLIER (P,H,STAR,I)                                          092S1359
00101      2*    C
00101      3*    C *****SUBROUTINE MOLIER FOR LINKS ONE AND TWO AND THREE*****************092S1361
00101      4*    C                                                                           092S1362
00103      5*          DIMENSION D(29)                                                       092S1363
00104      6*          EQUIVALENCE(D(4),PLOG),(D(5),CONA),(D(6),CONB),(D(7),SR),(D(8),TSMD092S1364
00104      7*         1ALL),(D(9),THETA),(D(10),ASMALL),(D(11),BSMALL),(D(12),CSMALL),(D(092S1365
00104      8*         213),DSMALL),(D(14),CIRH),(D(15),TAU1),(D(16),FSMALL),(D(17),CSMALLD092S1366
00104      9*         3),(D(18),SMALLM),(D(19),TAU),(D(20),ZT,TEMP),(D(21),RHO),(D(22),EP092S1367
00104     10*         4S),(D(23),CHI),(D(24),ETA),(D(25),SIGMA),(D(26),ZETA),(D(27),SONIC092S1368
00104     11*         5),(D(28),VEL),(D(29),ART)                                            092S1369
00104     12*    C                                ZERO OUT STORAGE                          092S1370
00105     13*          DO 1 N=1,29                                                           092S1371
00110     14*        1 D(N)=0.0                                                              092S1372
00110     15*    C                                STORE VALUES OF P,H,I                     092S1373
00112     16*          J=I                                                                   092S1374
00113     17*          D(1)=FLOAT(J)                                                         092S1375
00114     18*          D(2)=P                                                                092S1376
00115     19*          D(3)=H                                                                092S1377
00115     20*    C                                COMPUTE LOG P/P0                          092S1378
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00116    21*          PLOG=0.43429448*ALOG(D(2))                                  092S1379
00117    22*      333 GO TO (100,400,100,200),J
00117    23*      C                                I=1,COMPUTE SONIC VELOCITY     092S1381
00117    24*      C                                I=2,COMPUTE ENTROPY            092S1382
00117    25*      C                                I=3,COMPUTE DENSITY            092S1383
00117    26*      C                                I=4, COMPUTE TEMPERATURE       092S1384
00117    27*      C     DENSITY                    COMPUTE SMALLT                 092S1385
00120    28*      100 TSMALL=5224.0/(33.842-P_OG)+(-1.7609)*(PLOG+68.5)           092S1386
00120    29*      C                                COMPUTE THETA                  092S1387
00121    30*          THETA=12.813+0.46218*((PLOG+4.1)**2)                        092S1388
00121    31*      C                                COMPUTE COEF OF CIRH           092S1389
00122    32*          GO TO 201                                                   092S1390
00122    33*      C                                COMPUTE TAU1                   092S1391
00123    34*      101 TAU1=EXP(D(3)/50.0-10.0)                                    092S1392
00124    35*          TAU1=(9.2217+(-.27639)*((PLOG+3.5)**2))*TAU1                092S1393
00125    36*          GO TO (300,500,102,500),J                                   092S1394
00125    37*      C                                COMPUTE TAU                    092S1395
00126    38*      102 FSMALL=EXP(-2.0*(PLOG-0.75))+1.0                            092S1396
00127    39*          FSMALL=-1.83+1.098/FSMALL                                   092S1397
00130    40*          GSMALL=+0.00038+0.000953/(PLOG+4.85)                        092S1398
00131    41*          SMALLM=-84.6+(-0.8)*PLOG*(1.0-0.5*PLOG)                     092S1399
00132    42*          TAU=-GSMALL*((D(3)+SMALLM)**2)                              092S1400
00133    43*          TAU=FSMALL*EXP(TAU)                                         092S1401
00134    44*          ZT=CIRH+TAU+TAU1                                            092S1402
00134    45*      C                                COMPUTE DENSITY                092S1403
00135    46*          RHO=D(2)/ZT                                                 092S1404
00136    47*          STOR=RHO                                                    092S1405
00137    48*      199 STAR=STOR                                                   092S1406
00140    49*          RETURN                                                      092S1407
00140    50*      C                                COMPUTE T/TO=TEMPERATURE       092S1408
00140    51*      C                                COMPUTE SMALL T                092S1409
00141    52*      200 TSMALL=230.6335/(10.0-P_OG)+0.183042*(PLOG+3.0)             092S1410
00141    53*      C                                COMPUTE THETA                  092S1411
00142    54*          THETA=2.1965+0.31961*((PLOG+4.1)**2)                        092S1412
00142    55*      C                                CALCULATE COEF, OF HTHETA=CIRH 092S1413
00143    56*      201 DSMALL=(THETA-TSMALL)/(2.0*TSMALL-THETA-79.4)               092S1414
00144    57*          BSMALL=79.4+(1.0-DSMALL)*(TSMALL-79.4)                      092S1415
00145    58*          ASMALL=(79.4-BSMALL)*DSMALL                                 092S1416
00146    59*          CSMALL=-ASMALL*DSMALL                                       092S1417
00147    60*          CIRH=ASMALL+(BSMALL*D(3))/250.0+CSMALL/(D(3)/250.0+DSMALL)  092S1418
00150    61*          GO TO (101,500,101,202),J                                   092S1419
00151    62*      202 FSMALL=EXP(-2.0*PLOG)+1.0                                   092S1420
00152    63*          FSMALL=-2.1965+1.46434/FSMALL                               092S1421
00153    64*          GSMALL=-0.00065+0.0120950/(PLOG+9.6)                        092S1422
00154    65*          SMALLM=-94.2+(-1.6)*PLOG*(1.0-.5*PLOG)                      092S1423
00155    66*          TAU=-GSMALL*((D(3)+SMALLM)**2)                              092S1424
00156    67*          TAU=FSMALL*EXP(TAU)                                         092S1425
00156    68*      C                                COMPUTE TAU1                   092S1426
00157    69*          TAU1=EXP(D(3)/50.0-10.0)                                    092S1427
00160    70*          TAU1=(5.4913+(-.56743)*((PLOG+1.75)**2))*TAU1               092S1428
00161    71*          TEMP=CIRH+TAU+TAU1                                          092S1429
00162    72*          STOR=TEMP                                                   092S1430
00163    73*          GO TO 199                                                   092S1431
00163    74*      C                                COMPUTE SONIC VELOCITY         092S1432
00164    75*      300 SONIC=SQRT (CIRH+TAU1)                                      092S1433
00164    76*      C                                COMPUTE SPECIFIC HEAT          092S1434
00165    77*          EPS=1.0459+0.009775*PLOG                                    092S1435
00166    78*          CHI=(12.707-0.9775*PLOG)*0.00001                            092S1436
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00167    79*          ETA=1.1826-EPS                                          092S1437
00170    80*          SIGMA=-(0.001955+CHI)/ETA                               092S1438
00171    81*          ZETA=EXP(SIGMA*D(3))                                    092S1439
00172    82*          ZETA=EPS+CHI*D(3)+ETA*ZETA                              092S1440
00173    83*          VEL=SONIC*ZETA                                          092S1441
00173    84*     C                                  COMPUTE TAU COEF.        092S1442
00174    85*          FSMALL=EXP(-2.0*PLOG)+1.0                               092S1443
00175    86*          FSMALL=-0.5+0.35454/FSMALL                              092S1444
00176    87*          GSMALL=0.002                                            092S1445
00177    88*          SMALLM=-80.0+(-1.28)*PLOG*(1.0-PLOG)                    092S1446
00200    89*          TAU=-GSMALL*((D(3)+SMALLM)**2)                          092S1447
00201    90*          TAU=FSMALL*EXP(TAU)                                     092S1448
00201    91*     C                                  COMPUTE SONIC VELOCITY   092S1449
00202    92*          ART=VEL+TAU                                             092S1450
00203    93*          STOR=ART                                                092S1451
00204    94*          GO TO 199                                               092S1452
00204    95*     C                                  COMPUTE S/R-ENTROPY      092S1453
00205    96*     400  CONB=0.07*(45.0-D(3))                                   092S1454
00206    97*          CONB=1.0+EXP(CONB)                                      092S1455
00207    98*          CONB=-2.307-(0.0042*D(3)-.092)/CONB                     092S1456
00210    99*          CONA=11.1*0.43429448*ALOG(D(3))                         092S1457
00211   100*          CONA=CONA+11.875+0.0245*D(3)+175.0/(D(3)+50.0)          092S1458
00212   101*          SR=CONA+CONB*PLOG                                       092S1459
00213   102*          STOR=SR                                                 092S1460
00214   103*          GO TO 199                                               092S1461
00215   104*     500  WRITE(6,502)                                           092S1462
00217   105*          CALL DUMP(D,D(29),1)                                    092S1463
00220   106*     502  FORMAT(35H1  LOST IN LOOP - EXITING WITH DUMP)         092S1464
00221   107*          GO TO 199                                               092S1465
00222   108*          END                                                     092S1466

        END OF COMPILATION:  NO DIAGNOSTICS.
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@ FOR PROPR                                                    20 AUG 72          20:41: 4,403
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC3 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:41:04

    SUBROUTINE PROPR     ENTRY POINT 000271

    STORAGE USED: CODE(1) 000304; DATA(0) 000142; BLANK COMMON(2) 00000

    EXTERNAL REFERENCES (BLOCK, NAME)

      0003   EXIT
      0004   ALOG
      0005   EXP
      0006   NWDU$
      0007   NIO1$
      0010   NIO2$
      0011   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

      0001   000135 100L      0001   000141 101L      0001   000017 113G      0001   000153 144G      0001   000160 150G
      0001   000166 200L      0001   000253 400L      0000   000004 500F      0000 R 000002 DEL       0000 R 000001 EXX
      0000 R 000017 HH        0000   000121 INJP$     0000 I 000000 JG        0000 I 000003 L         0000 R 000017 PLOG
      0000 R 000020 SOR       0000 R 000050 SS        0000 R 000050 TOL

198

00101      1*          SUBROUTINE PROPR(P,SR,HSTOR)                                    092S1320
00103      2*          DIMENSION HH(25),SS(25)                                         092S1321
00104      3*          EQUIVALENCE (HH,PLOG),(SS,TOL),(HH(2),SOR)                      092S1322
00105      4*          SS(2)=P                                                         092S1323
00106      5*          PLOG=0.43429448*ALOG(SS(2))                                     092S1324
00107      6*          SOR=SR                                                          092S0132
00110      7*          HH(3)=HSTOR                                                     092S1326
00111      8*          TOL=0.00001                                                     092S1327
00112      9*          DO 100 JG=3,23                                                  092S1328
00115     10*        1 EXX=EXP(0.07*(45.0-HH(JG)))                                     092S1329
00116     11*          SS(JG)=11.1*0.43429448*ALOG(HH(JG))+11.875+.0245*HH(JG)         092S1330
00117     12*          SS(JG)=175.0/(HH(JG)+50.0)+SS(JG)                               092S1331
00120     13*          SS(JG)=-2.307*PLOG-PLOG*(0.0042*HH(JG)+.092)/(1.0+EXX)+SS(JG)   092S1332
00121     14*          DEL=EXX*(0.07*(0.0042*HH(JG)+.092)+0.0042)*0.0042               092S1333
00122     15*          DEL=PLOG*DEL/((1.0+EXX)**2)                                     092S1334
00123     16*          DEL=(11.1*0.43429448)/HH(JG)+0.0245-175.0/((HH(JG)+50.0)**2)-DEL 092S1335
00124     17*          DEL=(SOR-SS(JG))/DEL                                            092S1336
00125     18*          IF(ABS (DEL/HH(JG))-TOL)200,200,50                              092S1337
00130     19*       50 HH(JG+1)=HH(JG)+DEL                                             092S1338
00131     20*          IF(HH(JG+1)) 101,101,100                                        092S1339
00134     21*      100 CONTINUE                                                        092S1340
00136     22*      101 WRITE(6,500)SS(2),SOR,PLOG,TOL,(HH(L),L=3,23),(SS(L),L=3,23)    092S1341
00154     23*      500 FORMAT(1H1,40X,39HFAILURE TO CONVERGE ON ENTHALPY AT BODY/(1P8E15.092S1342
00154     24*         17))                                                            092S1343
00155     25*          CALL EXIT                                                       092S1344
00156     26*      200 HH(JG+1)=HH(JG)+DEL                                             092S1345
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00157     27*           IF(HH(JG+1)) 101,101,201                                  092S1346
00162     28*       201 EXX=EXP(0.07*(45.0-HH(JG+1)))                             092S1347
00163     29*           SS(JG+1)=11.1*0.43429448*ALOG(HH(JG+1))+11.875            092S1348
00164     30*           SS(JG+1)=SS(JG+1)+.0245*HH(JG+1)+175.0/(HH(JG+1)+50.0)    092S1349
00165     31*           SS(JG+1)=-2.307*PLOG+SS(JG+1)                             092S1350
00166     32*           SS(JG+1)=SS(JG+1)-PLOG*(0.0042*HH(JG+1)-0.092)/(1.0+EXX)  092S1351
00167     33*           IF(ABS((SOR-SS(JG+1))/SOR)-0.00001)400,400,300            092S1352
00172     34*       300 TOL=TOL/2.0                                               092S1353
00173     35*           GO TO 100                                                 092S1354
00174     36*       400 HSTOR=HH(JG+1)                                            092S1355
00175     37*           RETURN                                                    092S1356
00176     38*           END                                                       092S1357
00176     39*     C

        END OF COMPILATION:        NO  DIAGNOSTICS.
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UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 20 AUG 72 AT 20:41:06

SUBROUTINE OUTPUT ENTRY POINT 000362

STORAGE USED: CODE(1) 000375; DATA(0) 000176; BLANK COMMON(2) 000001

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000042
0005	MAIN3	000010
0006	MAIN5	000550
0007	BODY1	000120
0010	DIFF1	042300
0011	CONR2	000023
0012	THERM1	014710
0013	SHOCK1	000120

EXTERNAL REFERENCES (BLOCK, NAME)

0014	CONVR2
0015	NWDL$
0016	NIO2$
0017	SQRT
0020	NEXP6$
0021	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000037	100F	0000	000040	101F	0000	000062	102F	0000	000066	103F	0000	000105	104F
0000	000120	106F	0000	000122	111F	0001	000026	140G	0001	000050	155G	0001	000106	170G
0012 R	004230	A	0004 R	000000	ACH	0005	000005	AIN	0004	000037	ANGLE	0000 R	000026	A2
0004	000041	BETA	0006	000346	BXI	0000 R	000000	CF	0000 R	000036	CH	0007	000074	CURV
0000 R	000035	DAM	0000 R	000032	DHSTAG	0004	000013	DNU	0004	000016	DNU2	0004 R	000014	DT
0000 R	000027	DUM	0000 R	000024	DUM2	0004	000012	DXI	0004	000017	DXINU	0004	000015	DXI2
0005	000003	EIN	0004	000034	ELL	0004	000025	EPS	0004	000030	ERR	0004 R	000006	GA
0004 R	000002	GAMMA	0004	000007	GB	0004	000010	GC	0004	000011	GD	0004	000040	GE
0000 R	000031	HH	0005 R	000004	HIN	0004	000033	HST	0011	000000	H1	0011	000013	H1NU
0011	000015	H1XI	0011	000003	H12	0011	000006	H123	0011	000001	H2	0011	000016	H2NU
0011	000014	H2XI	0011	000004	H23	0011	000002	H3	0011	000020	H3NU	0011	000017	H3XI
0011	000021	H3XINU	0011	000022	H3XIXI	0011	000005	H31	0003	000012	I	0000	000151	INJPS
0003	000013	J	0003	000006	JA	0003	000021	JC	0003 I	000014	K	0003	000007	KA
0003	000017	LB	0003	000020	LE	0003 I	000010	M	0003	000000	MA	0003 I	000004	MC
0003	000002	MCM	0003 I	000015	M1	0003 I	000011	N	0003	000001	NA	0003 I	000005	NC
0003 I	000003	NCM	0006 R	000024	NU	0003 I	000016	N1	0012 R	000000	P	0007	000050	PHI
0005 R	000000	PIN	0000 R	000030	PP	0004 R	000004	PR	0013 R	000074	PSI	0000 R	000025	Q2
0004	000021	RANGE	0004 R	000003	RE	0000 R	000034	REVARI	0005 R	000001	RIN	0006 R	000202	S
0004	000022	SMIN	0006	000226	SN	0006	000372	SQEZ	0006 R	000252	ST	0004	000005	STAB
0006	000276	STN	0006	000322	SXI	0012 R	010460	T	0004 R	000020	TIME	0005	000002	TIN
0000 R	000033	TT	0004	000036	TW	0010 R	000000	U	0005	000006	UIN	0010	021140	UN
0004 R	000001	U0	0011 R	000007	U1	0011 R	000010	U2	0011 R	000011	U3	0011 R	000012	U4
0005	000007	VIN	0006 R	000000	XI	0004	000035	XIMAX	0007	000000	YB	0013 R	000000	YS

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C0C4   000024 YO       0007   000024 ZB       0013 R 000024 ZS       0013   000050 ZSY      0004   000023 ZO


00101     1*          SUBROUTINE OUTPUT
00101     2*    C
00103     3*          PARAMETER MM=20,NN=110,JJ=4
00104     4*          REAL NL
00105     5*          DIMENSION CF(MM)
00106     6*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107     7*          COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00107     8*         1            NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00107     9*         2            ,XIMAX,TW,ANGLE,GE,BETA
00110    10*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00111    11*          COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00111    12*         1             BXI(MM),SBEZ(NN)
00112    13*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00113    14*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00114    15*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00114    16*         1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00115    17*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00116    18*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00116    19*    C
00117    20*        100 FORMAT(1H1)
00120    21*        101 FORMAT(1HO,9H AT LINE ,I10/10X,1HP,12X,1HT,12X,3HRHO,12X,1HU,12X,1
00120    22*           1HV,11X,1HE,12X,1HM,13X,1HZ,7X,2HCF,7X,2HCH)
00121    23*        102 FORMAT(I3,8E13.5,2X,2E9.4)
00122    24*        103 FORMAT(1H1,8H AT STEP,I10,15X,4H DT=E16.7,3X,5HAT N=I3,4H, M=I3,4H
00122    25*           1,     /50X,5HTIME=E16.7/1HO)
00123    26*        104 FORMAT(35X,5HY     ,5X,14HSHOCK VELOCITY,9X,3HPSI,12X,2HZS,15X,2HYS
00123    27*           1 )
00124    28*        106 FORMAT(I27,5E15.5)
00125    29*        111 FORMAT(1HO,9H AT LINE ,I10/10X,1HP,12X,1HT,12X,3HRHO,12X,1HU,12X,1
00125    30*           1HV,11X,1HE,12X,1HM,13X,1HZ,7X,6HDHSTAG)
00125    31*    C
00126    32*          WRITE(6,103)K,DT,N1,M1,TIME
00135    33*          WRITE(6,104)
00137    34*          DO 35 M=2,MC
00142    35*          DUM2=XI(M)
00143    36*         35 WRITE(6,106)M,DUM2,ST(M),PSI(M),ZS(M),YS(M)
00154    37*          DO 50 N=2,NC
00157    38*          IF(N.NE.NC)WRITE(6,111)N
00163    39*          IF(N.EQ.NC)WRITE(6,101)N
00167    40*          DO 50 M=2,MC
00172    41*          CALL CONVR2(N,M)
00173    42*          Q2=U2*U2+U3*U3
00174    43*          A2=A(N,M)*A(N,M)
00175    44*          DUM=SQRT(Q2/A2)
00176    45*          PP=P(N,M)
00177    46*          HH=U4*PIN/RIN*PP*PIN/U1/RIN
00200    47*          DHSTAG=1.-HH/(HIN+UO**2./2.)
00201    48*          TT=T(N,M)
00202    49*          REVAR1=RE*(T(N,M)+0.5)/1.5/T(N,M)**1.5
00203    50*          DAM=S(M)*(1.-NU(N))
00204    51*          IF(N.EQ.NC)CF(M)=2./REVAR1/SQRT(GAMMA)/ACH*U(NCM,M,2)/U(NCM,M,1)/
00204    52*         1             S(M)/(1.-NU(NCM))
00206    53*          IF(N.EQ.NC)CH=GA/PR/REVAR1/((HIN+UO**2./2.-HH)/PIN*RIN)*(T(NCM,M)
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00206     54*          1    -T(NC,M))/S(M)/(1.-NU(NCM))
00210     55*           IF(N.NE.NC)WRITE(6,102)M,PP,TT,U1,U2,U3,U4,DUM,DAM,DHSTAG
00225     56*           IF(N.EQ.NC)WRITE(6,102)M,PP,TT,U1,U2,U3,U4,DUM,DAM,CF(M),CH
00243     57*       50 CONTINUE
00243     58*     C
00246     59*           RETURN
00247     60*           END

        END OF COMPILATION:       NO  DIAGNOSTICS.
```

VISCOUS SHOCK LAYER SOLUTION AT ZERO FLOW INCIDENCE
PROGRAM G13Y

IDEAL GAS BLUNT BODY FLOW AROUND A HYPERBOLOID--10 DEGREES

RUN NUMBER C ON 6/22/72
LB= 1 LE= 3

MA= 10 NA= 45 KA= 500 JA= 50 BETA= 3.00

GAMMA= ,1400000+01 STAB= ,5000000+00

RE= ,1792E+06 PR= ,71000+00 TW= ,60000+01

ZO= ,0000 YO= ,0000 XIMAX= ,1400+01 ANGLE= ,10000+02

UO=,,2000+05 PIN=,2308+02 HIN=,2523+07 RIN=,3206-04 TIN=,4195+03 EIN=,1800+07 ACH=,1992+02

EPS 1 TO 7
,100000-03 ,100000-01 ,000000

M=	X1=	Z3=	YB=	PH1=	CURV=
2	,0000	,965	,00000	1,57080	1,000
3	,1400	,956	,14000	1,43174	,970
4	,2800	,927	,27865	1,29935	,891
5	,4200	,880	,41352	1,17962	,784
6	,5600	,818	,54295	1,07529	,672
7	,7000	,744	,66611	,98634	,568
8	,8400	,661	,78287	,91116	,480
9	,9800	,569	,89350	,84767	,406
10	1,1200	,471	,99846	,79380	,346
11	1,2600	,368	1,09829	,74776	,298
12	1,4000	,261	1,19349	,70810	,258
2	,1572				
3	,2239				
4	,2905				
5	,3572				
6	,4239				
7	,4905				
8	,5572				
9	,6239				
10	,6905				
11	,7572				
12	,8239				
13	,8905				
14	,9572				
15	1,0239				
16	1,0905				
17	1,1572				
18	1,2239				
19	1,2905				
20	1,3572				
21	1,4239				
22	1,4905				
23	1,5572				
24	1,6239				
25	1,6905				
26	1,7572				
27	1,8239				
28	1,8905				
29	1,9572				
30	2,0239				
31	2,0905				
32	2,1572				
33	2,2239				
34	2,2905				
35	2,3572				
36	2,4239				
37	2,4905				
38	2,5572				
39	2,6239				
40	2,6905				
41	2,7572				
42	2,8239				
43	2,8905				
44	2,9572				
45	3,0239				
46	3,0905				
47	3,1572				

AT STEP 0 DT= .7732214+00 AT N= 0, M= 0,
TIME= .0000000

	Y	SHOCK VELOCITY	PSI	ZS	YS
2	.00000	.00000	.36806-15	.13186+01	.35030-09
3	.14000+00	.00000	.21215-12	.13056+01	.18897+00
4	.28000+00	.00000	.44168-12	.12677+01	.37356+00
5	.42000+00	.00000	.69759-12	.12084+01	.54890+00
6	.56000+00	.00000	.97687-12	.11322+01	.71251+00
7	.70000+00	.00000	.12717-11	.10435+01	.86397+00
8	.84000+00	.00000	.15758-11	.94581+00	.10041+01
9	.98000+00	.00000	.18853-11	.84162+00	.11343+01
10	.11200+01	.00000	.21982-11	.73268+00	.12559+01
11	.12600+01	.00000	.25131-11	.62020+00	.13703+01
12	.14000+01	.00000	.25371-11	.50502+00	.14785+01

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.46280+03	.78105+02	.59253+01	-.72088-04	-.39779+01	.20317+03	.38041+00	.35309+00	.2980-07
3	.45417+03	.76667+02	.59239+01	.32258+01	-.39347+01	.20461+03	.49111+00	.35331+00	.5960-07
4	.43056+03	.72732+02	.59198+01	.52363+01	-.38130+01	.20855+03	.72437+00	.35397+00	.2980-07
5	.39776+03	.67265+02	.59133+01	.88600+01	-.36337+01	.21401+03	.98682+00	.35508+00	.4470-07
6	.36189+03	.61287+02	.59049+01	.11038+02	-.34223+01	.21999+03	.12476+01	.35662+00	.7451-07
7	.32725+03	.55513+02	.58950+01	.12796+02	-.32000+01	.22576+03	.14961+01	.35861+00	.2980-07
8	.29596+03	.50299+02	.58841+01	.14198+02	-.29804+01	.23098+03	.17288+01	.36104+00	.5960-07
9	.26871+03	.45756+02	.58726+01	.15316+02	-.27704+01	.23552+03	.19447+01	.36390+00	.8941-07
10	.24537+03	.41867+02	.58608+01	.16213+02	-.25731+01	.23941+03	.21442+01	.36721+00	.5960-07
11	.22553+03	.38559+02	.58488+01	.16939+02	-.23888+01	.24272+03	.23283+01	.37097+00	.5960-07
12	.20732+03	.35524+02	.58359+01	.17572+02	-.22588+01	.24575+03	.25122+01	.37516+00	.7451-07

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.46382+03	.78155+02	.59347+01	-.70486-04	-.38895+01	.20295+03	.37183+00	.31148+00	.6137-03
3	.45522+03	.76727+02	.59331+01	.31541+01	-.38473+01	.20419+03	.48001+00	.31167+00	.1281-02
4	.43167+03	.72857+02	.59252+01	.50977+01	-.37282+01	.20768+03	.70768+00	.31226+00	.2635-02
5	.39886+03	.67489+02	.59114+01	.86632+01	-.35529+01	.21256+03	.96334+00	.31323+00	.4429-02
6	.36289+03	.61622+02	.58924+01	.10793+02	-.33462+01	.21789+03	.12167+01	.31459+00	.6393-02
7	.32802+03	.55953+02	.58690+01	.12511+02	-.31289+01	.22304+03	.14575+01	.31635+00	.8331-02
8	.29640+03	.50833+02	.58419+01	.13882+02	-.29141+01	.22769+03	.16823+01	.31849+00	.1014-01
9	.26874+03	.46369+02	.58121+01	.14976+02	-.27089+01	.23173+03	.18903+01	.32102+00	.1177-01
10	.24428+03	.42544+02	.57643+01	.15853+02	-.25159+01	.23518+03	.20820+01	.32394+00	.1322-01
11	.22439+03	.39287+02	.57404+01	.16563+02	-.23357+01	.23811+03	.22585+01	.32725+00	.1451-01
12	.20613+03	.36298+02	.57152+01	.17182+02	-.22086+01	.24079+03	.24344+01	.33095+00	.1572-01

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.46485+03	.78205+02	.59442+01	-.68884-04	-.38011+01	.20274+03	.36327+00	.28080+00	.1199-02
3	.45628+03	.76787+02	.59424+01	.30824+01	-.37599+01	.20379+03	.46892+00	.28097+00	.2517-02
4	.43278+03	.72982+02	.59306+01	.59591+01	-.36435+01	.20685+03	.69101+00	.28150+00	.5176-02
5	.39997+03	.67713+02	.59095+01	.84663+01	-.34722+01	.21115+03	.93994+00	.28238+00	.8694-02
6	.36390+03	.61956+02	.58799+01	.10547+02	-.32702+01	.21586+03	.11860+01	.28361+00	.1255-01
7	.32080+03	.56394+02	.58430+01	.12227+02	-.30578+01	.22041+03	.14192+01	.28518+00	.1635-01
8	.29685+03	.51367+02	.58001+01	.13567+02	-.28479+01	.22450+03	.16363+01	.28712+00	.1989-01
9	.26877+03	.46902+02	.57521+01	.14635+02	-.26473+01	.22806+03	.18366+01	.28940+00	.2309-01
10	.24320+03	.43221+02	.56694+01	.15493+02	-.24587+01	.23108+03	.20207+01	.29203+00	.2594-01
11	.22326+03	.40015+02	.56339+01	.16186+02	-.22826+01	.23364+03	.21898+01	.29501+00	.2847-01
12	.20496+03	.37071+02	.55970+01	.16791+02	-.21584+01	.23598+03	.23579+01	.29835+00	.3086-01

AT LINE 5

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,46589+03	,78255+02	,59536+01	-,57282-04	-,37127+01	,20253+03	,35471+00	,25648+00	,1757-02
3	,45734+03	,76846+02	,59516+01	,30108+01	-,36724+01	,20339+03	,45784+00	,25664+00	,3707-02
4	,43389+03	,73107+02	,59360+01	,58205+01	-,35588+01	,20604+03	,67438+00	,25712+00	,7622-02
5	,40109+03	,67937+02	,59075+01	,82694+01	-,33914+01	,20978+03	,91661+00	,25793+00	,1280-01
6	,36490+03	,62291+02	,58675+01	,10302+02	-,31941+01	,21389+03	,11555+01	,25905+00	,1846-01
7	,32957+03	,56835+02	,58173+01	,11943+02	-,29867+01	,21786+03	,13812+01	,26049+00	,2405-01
8	,29729+03	,51901+02	,57585+01	,13251+02	-,27817+01	,22142+03	,15907+01	,26225+00	,2926-01
9	,26880+03	,47595+02	,56928+01	,14295+02	-,25857+01	,22451+03	,17834+01	,26434+00	,3397-01
10	,24212+03	,43898+02	,55760+01	,15132+02	-,24016+01	,22712+03	,19602+01	,26674+00	,3817-01
11	,22214+03	,40744+02	,55295+01	,15810+02	-,22296+01	,22932+03	,21221+01	,26947+00	,4190-01
12	,20379+03	,37844+02	,54812+01	,16401+02	-,21082+01	,23132+03	,22828+01	,27251+00	,4542-01

AT LINE 6

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,46692+03	,78306+02	,59630+01	-,55680-04	-,36243+01	,20233+03	,34615+00	,23634+00	,2287-02
3	,45840+03	,76906+02	,59609+01	,29391+01	-,35850+01	,20301+03	,44677+00	,23649+00	,4851-02
4	,43500+03	,73232+02	,59414+01	,56819+01	-,34740+01	,20526+03	,65777+00	,23693+00	,9974-02
5	,40220+03	,68161+02	,59056+01	,80725+01	-,33107+01	,20847+03	,89335+00	,23767+00	,1673-01
6	,36591+03	,62626+02	,58550+01	,10057+02	-,31181+01	,21199+03	,11231+01	,23870+00	,2413-01
7	,33035+03	,57275+02	,57916+01	,11658+02	-,29156+01	,21540+03	,13434+01	,24003+00	,3144-01
8	,29773+03	,52436+02	,57173+01	,12936+02	-,27154+01	,21844+03	,15455+01	,24166+00	,3824-01
9	,26884+03	,48208+02	,56342+01	,13955+02	-,25242+01	,22107+03	,17309+01	,24358+00	,4440-01
10	,24104+03	,44574+02	,54842+01	,14772+02	-,23444+01	,22329+03	,19005+01	,24580+00	,4990-01
11	,22102+03	,41472+02	,54269+01	,15433+02	-,21765+01	,22514+03	,20556+01	,24831+00	,5478-01
12	,20262+03	,38617+02	,53679+01	,16010+02	-,20580+01	,22682+03	,22090+01	,25111+00	,5939-01

AT LINE 7

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,46796+03	,78356+02	,59725+01	-,64078-04	-,35359+01	,20214+03	,33760+00	,21915+00	,2789-02
3	,45947+03	,76966+02	,59701+01	,28674+01	-,34975+01	,20264+03	,43570+00	,21929+00	,5950-02
4	,43612+03	,73357+02	,59468+01	,55433+01	-,33893+01	,20450+03	,64119+00	,21970+00	,1223-01
5	,40332+03	,68385+02	,59037+01	,78796+01	-,32299+01	,20719+03	,87018+00	,22038+00	,2051-01
6	,36693+03	,62960+02	,58426+01	,98114+01	-,30420+01	,21016+03	,10948+01	,22134+00	,2957-01
7	,33114+03	,57716+02	,57660+01	,11374+02	-,28444+01	,21302+03	,13060+01	,22257+00	,3851-01
8	,29818+03	,52970+02	,56763+01	,12620+02	-,26492+01	,21557+03	,15007+01	,22408+00	,4685-01
9	,26887+03	,48820+02	,55761+01	,13614+02	-,24626+01	,21776+03	,16790+01	,22586+00	,5440-01
10	,23997+03	,45251+02	,53939+01	,14412+02	-,22872+01	,21959+03	,18416+01	,22791+00	,6113-01
11	,21990+03	,42200+02	,53263+01	,15057+02	-,21234+01	,22111+03	,19900+01	,23024+00	,6713-01
12	,20147+03	,39391+02	,52568+01	,15620+02	-,20078+01	,22248+03	,21365+01	,23285+00	,7279-01

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,46900+03	,78406+02	,59820+01	-,52476-04	-,34475+01	,20196+03	,32906+00	,20415+00	,3264-02
3	,46054+03	,77026+02	,59794+01	,27957+01	-,34101+01	,20229+03	,42464+00	,20428+00	,7003-02
4	,43724+03	,73482+02	,59522+01	,54048+01	-,33046+01	,20377+03	,62463+00	,20466+00	,1439-01
5	,40444+03	,68609+02	,59017+01	,76787+01	-,31492+01	,20596+03	,84707+00	,20530+00	,2412-01
6	,36794+03	,63295+02	,58303+01	,95662+01	-,29660+01	,20839+03	,10648+01	,20619+00	,3476-01
7	,33192+03	,58157+02	,57406+01	,11089+02	-,27733+01	,21073+03	,12687+01	,20734+00	,4526-01
8	,29862+03	,53504+02	,56356+01	,12305+02	-,25830+01	,21280+03	,14564+01	,20874+00	,5507-01
9	,26890+03	,49433+02	,55186+01	,13274+02	-,24011+01	,21457+03	,16277+01	,21040+00	,6394-01
10	,23890+03	,45928+02	,53051+01	,14051+02	-,22300+01	,21603+03	,17836+01	,21232+00	,7187-01
11	,21880+03	,42928+02	,52275+01	,14681+02	-,20703+01	,21722+03	,19254+01	,21448+00	,7893-01
12	,20032+03	,40164+02	,51481+01	,15229+02	-,19576+01	,21829+03	,20652+01	,21691+00	,8560-01

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.47004+03	.78456+02	.59915+01	-.60874-04	-.33591+01	.20178+03	.32052+00	.19085+00	.3710-02
3	.46161+03	.77086+02	.59887+01	.27240-01	-.33227+01	.20194+03	.41360+00	.19097+00	.8011-02
4	.43836+03	.73607+02	.59576+01	.52662-01	-.32198+01	.20307+03	.60810+00	.19133+00	.1646-01
5	.40557+03	.68834+02	.58998+01	.74818-01	-.30684+01	.20478+03	.82404+00	.19192+00	.2757-01
6	.36896+03	.63630+02	.58179+01	.93209-01	-.28899+01	.20669+03	.10348+01	.19276+00	.3971-01
7	.33271+03	.58597+02	.57152+01	.10805-02	-.27022+01	.20852+03	.12318+01	.19383+00	.5171-01
8	.29907+03	.54038+02	.55953+01	.11989-02	-.25167+01	.21013+03	.14125+01	.19514+00	.6290-01
9	.26893+03	.50046+02	.54617+01	.12934-02	-.23395+01	.21149+03	.15769+01	.19669+00	.7305-01
10	.23784+03	.46605+02	.52178+01	.13691-02	-.21728+01	.21260+03	.17263+01	.19848+00	.8212-01
11	.21769+03	.43656+02	.51306+01	.14304-02	-.20172+01	.21348+03	.18618+01	.20051+00	.9019-01
12	.19917+03	.40937+02	.50416+01	.14839-02	-.19074+01	.21426+03	.19951+01	.20278+00	.9783-01

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.47109+03	.78506+02	.60010+01	-.59272-04	-.32707+01	.20161+03	.31198+00	.17890+00	.4128-02
3	.46268+03	.77146+02	.59980+01	.26523-01	-.32352+01	.20161+03	.40256+00	.17901+00	.8973-02
4	.43948+03	.73732+02	.59630+01	.51276-01	-.31351+01	.20239+03	.59161+00	.17935+00	.1844-01
5	.40670+03	.69058+02	.58979+01	.72849-01	-.29877+01	.20364+03	.80108+00	.17990+00	.3086-01
6	.36998+03	.63964+02	.58056+01	.90756-01	-.28139+01	.20505+03	.10050+01	.18069+00	.4443-01
7	.33349+03	.59038+02	.56900+01	.10521+02	-.26311+01	.20640+03	.11951+01	.18169+00	.5783-01
8	.29951+03	.54572+02	.55552+01	.11674+02	-.24505+01	.20757+03	.13690+01	.18292+00	.7035-01
9	.26897+03	.50659+02	.54054+01	.12593+02	-.22779+01	.20854+03	.15268+01	.18438+00	.8170-01
10	.23679+03	.47282+02	.51319+01	.13331+02	-.21157+01	.20930+03	.16697+01	.18605+00	.9186-01
11	.21660+03	.44384+02	.50354+01	.13928+02	-.19641+01	.20988+03	.17992+01	.18796+00	.1009+00
12	.19803+03	.41710+02	.49373+01	.14449+02	-.18572+01	.21038+03	.19262+01	.19008+00	.1095+00

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.47213+03	.78557+02	.60105+01	-.57670-04	-.31823+01	.20146+03	.30345+00	.16805+00	.4519-02
3	.46375+03	.77206+02	.60073+01	.25806-01	-.31478+01	.20130+03	.39153+00	.16816+00	.9889-02
4	.44061+03	.73857+02	.59684+01	.49890-01	-.30504+01	.20174+03	.57514+00	.16847+00	.2031-01
5	.40783+03	.69282+02	.58960+01	.70880-01	-.29069+01	.20255+03	.77819+00	.16900+00	.3398-01
6	.37101+03	.64299+02	.57933+01	.88303-01	-.27378+01	.20348+03	.97541+00	.16973+00	.4890-01
7	.33428+03	.59479+02	.56649+01	.10236+02	-.25600+01	.20437+03	.11587+01	.17068+00	.6365-01
8	.29996+03	.55107+02	.55154+01	.11358+02	-.23843+01	.20511+03	.13258+01	.17183+00	.7742-01
9	.26900+03	.51272+02	.53497+01	.12253+02	-.22164+01	.20570+03	.14772+01	.17320+00	.8992-01
10	.23573+03	.47959+02	.50474+01	.12971+02	-.20585+01	.20613+03	.16139+01	.17477+00	.1011+00
11	.21551+03	.45112+02	.49421+01	.13551+02	-.19111+01	.20643+03	.17375+01	.17656+00	.1111+00
12	.19690+03	.42483+02	.48352+01	.14058+02	-.18070+01	.20665+03	.18585+01	.17855+00	.1205+00

AT LINE 12

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.47318+03	.78607+02	.60200+01	-.56068-04	-.30939+01	.20130+03	.29493+00	.15812+00	.4881-02
3	.46483+03	.77265+02	.60167+01	.25090-01	-.30603+01	.20099+03	.38050+00	.15822+00	.1076-01
4	.44174+03	.73982+02	.59739+01	.48504-01	-.29656+01	.20112+03	.55869+00	.15851+00	.2210-01
5	.40896+03	.69506+02	.58940+01	.68911-01	-.28262+01	.20150+03	.75538+00	.15901+00	.3694-01
6	.37203+03	.64634+02	.57811+01	.85850-01	-.26618+01	.20198+03	.94593+00	.15970+00	.5314-01
7	.33507+03	.59919+02	.56399+01	.99521-01	-.24889+01	.20242+03	.11225+01	.16059+00	.6914-01
8	.30041+03	.55641+02	.54759+01	.11043+02	-.23181+01	.20276+03	.12831+01	.16168+00	.8410-01
9	.26903+03	.51884+02	.52945+01	.11913+02	-.21548+01	.20299+03	.14281+01	.16296+00	.9769-01
10	.23469+03	.48636+02	.49643+01	.12610+02	-.20013+01	.20310+03	.15588+01	.16444+00	.1099+00
11	.21442+03	.45840+02	.48504+01	.13175+02	-.18580+01	.20312+03	.16767+01	.16612+00	.1207+00
12	.19578+03	.43257+02	.47352+01	.13667+02	-.17568+01	.20308+03	.17919+01	.16800+00	.1310+00

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.47423+03	.78657+02	.60296+01	-.54466-04	-.30055+01	.20116+03	.28641+00	.14896+00	.5216-02

4	,44288+03	,74107+02	,59793+01	,47118+01	-,28809+01	,20052+03	,54228+00	,14933+00	,2379-01
5	,41010+03	,69730+02	,58921+01	,56943+01	-,27454+01	,20050+03	,73264+00	,14980+00	,3973-01
6	,37306+03	,64968+02	,57688+01	,83397+01	-,25857+01	,20054+03	,91660+00	,15045+00	,5713-01
7	,33587+03	,60360+02	,56150+01	,96677+01	-,24178+01	,20056+03	,10866+01	,15129+00	,7433-01
8	,30086+03	,56175+02	,54366+01	,10727+02	-,22518+01	,20051+03	,12408+01	,15231+00	,9040-01
9	,26906+03	,52497+02	,52400+01	,11572+02	-,20932+01	,20039+03	,13796+01	,15352+00	,1050+00
10	,23364+03	,49313+02	,48825+01	,12250+02	-,19441+01	,20020+03	,15045+01	,15492+00	,1181+00
11	,21334+03	,46568+02	,47605+01	,12793+02	-,18049+01	,19995+03	,16169+01	,15650+00	,1298+00
12	,19466+03	,44030+02	,46373+01	,13277+02	-,17066+01	,19967+03	,17264+01	,15827+00	,1409+00

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,47529+03	,78707+02	,60391+01	-,32865-04	-,29171+01	,20102+03	,27790+00	,14046+00	,5523-02
3	,46699+03	,77385+02	,60354+01	,23656+01	-,28855+01	,20042+03	,35848+00	,14055+00	,1236-01
4	,44402+03	,74232+02	,59847+01	,45753+01	-,27962+01	,19995+03	,52589+00	,14082+00	,2538-01
5	,41124+03	,69954+02	,58902+01	,64974+01	-,26647+01	,19954+03	,70997+00	,14125+00	,4236-01
6	,37410+03	,65303+02	,57566+01	,80944+01	-,25097+01	,19917+03	,88741+00	,14187+00	,6089-01
7	,33666+03	,60801+02	,55902+01	,93834+01	-,23467+01	,19878+03	,10509+01	,14266+00	,7919-01
8	,30130+03	,56709+02	,53977+01	,10412+02	-,21856+01	,19836+03	,11988+01	,14362+00	,9632-01
9	,26909+03	,53110+02	,51859+01	,11232+02	-,20317+01	,19792+03	,13317+01	,14477+00	,1119+00
10	,23261+03	,49990+02	,48021+01	,11890+02	-,18869+01	,19744+03	,14508+01	,14608+00	,1259+00
11	,21227+03	,47296+02	,46722+01	,12422+02	-,17518+01	,19693+03	,15579+01	,14758+00	,1384+00
12	,19355+03	,44803+02	,45413+01	,12886+02	-,16564+01	,19641+03	,16619+01	,14924+00	,1502+00

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,47634+03	,78758+02	,60487+01	-,31263-04	-,28287+01	,20089+03	,26939+00	,13254+00	,5802-02
3	,46808+03	,77445+02	,60448+01	,22939+01	-,27980+01	,20016+03	,34749+00	,13262+00	,1310-01
4	,44515+03	,74357+02	,59902+01	,44347+01	-,27114+01	,19940+03	,50953+00	,13287+00	,2689-01
5	,41239+03	,70178+02	,58883+01	,63005+01	-,25839+01	,19863+03	,68737+00	,13329+00	,4483-01
6	,37513+03	,65638+02	,57445+01	,78492+01	-,24336+01	,19786+03	,85837+00	,13386+00	,6440-01
7	,33746+03	,61241+02	,55655+01	,90991+01	-,22756+01	,19709+03	,10155+01	,13461+00	,8374-01
8	,30175+03	,57243+02	,53590+01	,10096+02	-,21194+01	,19632+03	,11573+01	,13552+00	,1018+00
9	,26913+03	,53723+02	,51325+01	,10892+02	-,19701+01	,19556+03	,12842+01	,13660+00	,1183+00
10	,23157+03	,50667+02	,47231+01	,11529+02	-,18298+01	,19480+03	,13978+01	,13784+00	,1331+00
11	,21120+03	,48025+02	,45856+01	,12046+02	-,16987+01	,19405+03	,14997+01	,13925+00	,1464+00
12	,19244+03	,45576+02	,44474+01	,12496+02	-,16062+01	,19330+03	,15985+01	,14082+00	,1589+00

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,47740+03	,78808+02	,60583+01	-,49661-04	-,27403+01	,20077+03	,26089+00	,12512+00	,6053-02
3	,46917+03	,77505+02	,60542+01	,22222+01	-,27106+01	,19990+03	,33650+00	,12519+00	,1379-01
4	,44630+03	,74482+02	,59956+01	,42961+01	-,26267+01	,19888+03	,49319+00	,12543+00	,2829-01
5	,41353+03	,70403+02	,58864+01	,61036+01	-,25032+01	,19777+03	,66484+00	,12582+00	,4714-01
6	,37617+03	,65972+02	,57323+01	,76039+01	-,23576+01	,19662+03	,82948+00	,12637+00	,6768-01
7	,33826+03	,61662+02	,55410+01	,88147+01	-,22044+01	,19548+03	,98035+00	,12707+00	,8798-01
8	,30220+03	,57778+02	,53206+01	,97809+01	-,20531+01	,19438+03	,11161+01	,12793+00	,1070+00
9	,26916+03	,54336+02	,50796+01	,10551+02	-,19085+01	,19332+03	,12373+01	,12895+00	,1243+00
10	,23054+03	,51344+02	,46453+01	,11169+02	-,17726+01	,19230+03	,13455+01	,13012+00	,1399+00
11	,21013+03	,48753+02	,45005+01	,11669+02	-,16456+01	,19132+03	,14424+01	,13145+00	,1538+00
12	,19134+03	,46350+02	,43554+01	,12105+02	-,15560+01	,19035+03	,15362+01	,13293+00	,1671+00

AT LINE 17

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,47846+03	,78858+02	,60679+01	-,48059-04	-,26519+01	,20066+03	,25240+00	,11813+00	,6276-02
3	,47026+03	,77565+02	,60636+01	,21505+01	-,26232+01	,19966+03	,32552+00	,11821+00	,1443-01
4	,44744+03	,74607+02	,60011+01	,41575+01	-,25420+01	,19839+03	,47689+00	,11843+00	,2960-01

5	,41466+03	,70627+02	,58844+01	,59067+01	-,24224+01	,19695+03	,64238+00	,11880+00	,4928-01
6	,37721+03	,66307+02	,57202+01	,73586+01	-,22815+01	,19544+03	,80073+00	,11931+00	,7071-01
7	,33906+03	,62123+02	,55165+01	,85304+01	-,21333+01	,19397+03	,94543+00	,11998+00	,9190-01
8	,30265+03	,58312+02	,52825+01	,94653+01	-,19869+01	,19255+03	,10752+01	,12079+00	,1118+00
9	,26919+03	,54949+02	,50272+01	,10211+02	-,18470+01	,19121+03	,11909+01	,12175+00	,1298+00
10	,22952+03	,52021+02	,45688+01	,10809+02	-,17154+01	,18994+03	,12939+01	,12286+00	,1461+00
11	,20907+03	,49461+02	,44171+01	,11293+02	-,15925+01	,18873+03	,13859+01	,12411+00	,1607+00
12	,19025+03	,47123+02	,42653+01	,11715+02	-,15058+01	,18756+03	,14748+01	,12551+00	,1746+00

AT LINE 18

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,47952+03	,78908+02	,60775+01	-,46457-04	-,25635+01	,20056+03	,24390+00	,11154+00	,6471-02
3	,47135+03	,77625+02	,60730+01	,20789+01	-,25357+01	,19944+03	,31455+00	,11161+00	,1503-01
4	,44859+03	,74732+02	,60065+01	,40189+01	-,24572+01	,19792+03	,46061+00	,11182+00	,3082-01
5	,41584+03	,70851+02	,58825+01	,57098+01	-,23417+01	,19617+03	,62000000	,11217+00	,5126-01
6	,37826+03	,66642+02	,57081+01	,71133+01	-,22055+01	,19434+03	,77212+00	,11265+00	,7351-01
7	,33986+03	,62563+02	,54922+01	,82460+01	-,20622+01	,19253+03	,91075+00	,11328+00	,9551-01
8	,30311+03	,58846+02	,52446+01	,91498+01	-,19207+01	,19082+03	,10348+01	,11405+00	,1161+00
9	,26922+03	,55561+02	,49754+01	,98704+01	-,17854+01	,18921+03	,11450+01	,11495+00	,1349+00
10	,22850+03	,52698+02	,44936+01	,10449+02	-,16582+01	,18770+03	,12429+01	,11600+00	,1519+00
11	,20802+03	,50209+02	,43352+01	,10916+02	-,15395+01	,18629+03	,13302+01	,11719+00	,1671+00
12	,18917+03	,47896+02	,41771+01	,11324+02	-,14556+01	,18492+03	,14143+01	,11851+00	,1816+00

AT LINE 19

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48059+03	,78959+02	,60872+01	-,44855-04	-,24751+01	,20046+03	,23542+00	,10530+00	,6639-02
3	,47244+03	,77684+02	,60824+01	,20072+01	-,24483+01	,19922+03	,30398+00	,10536+00	,1558-01
4	,44974+03	,74857+02	,60120+01	,38803+01	-,23725+01	,19748+03	,44435+00	,10556+00	,3194-01
5	,41700+03	,71075+02	,58806+01	,55129+01	-,22609+01	,19544+03	,59768+00	,10589+00	,5307-01
6	,37930+03	,66976+02	,56960+01	,68680+01	-,21294+01	,19329+03	,74365+00	,10635+00	,7606-01
7	,34066+03	,63004+02	,54679+01	,79617+01	-,19911+01	,19119+03	,87631+00	,10694+00	,9880-01
8	,30356+03	,59380+02	,52071+01	,88343+01	-,18544+01	,18919+03	,99465+00	,10767+00	,1201+00
9	,26926+03	,56174+02	,49241+01	,95301+01	-,17238+01	,18733+03	,10996+01	,10852+00	,1396+00
10	,22749+03	,53375+02	,44196+01	,10088+02	-,16010+01	,18560+03	,11926+01	,10951+00	,1571+00
11	,20697+03	,50937+02	,42548+01	,10540+02	-,14864+01	,18399+03	,12753+01	,11063+00	,1729+00
12	,18809+03	,48669+02	,40907+01	,10934+02	-,14054+01	,18243+03	,13549+01	,11188+00	,1879+00

AT LINE 20

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48166+03	,79009+02	,60968+01	-,45253-04	-,23867+01	,20037+03	,22694+00	,99368-01	,6778-02
3	,47354+03	,77744+02	,60919+01	,19355+01	-,23608+01	,19902+03	,29263+00	,99430-01	,1608-01
4	,45090+03	,74982+02	,60175+01	,37418+01	-,22878+01	,19707+03	,42813+00	,99616-01	,3297-01
5	,41816+03	,71299+02	,58787+01	,53160+01	-,21802+01	,19475+03	,57544+00	,99927-01	,5472-01
6	,38035+03	,67311+02	,56839+01	,66227+01	-,20534+01	,19232+03	,71532+00	,10036+00	,7837-01
7	,34147+03	,63445+02	,54438+01	,76773+01	-,19200+01	,18993+03	,84211+00	,10092+00	,1018+00
8	,30401+03	,59914+02	,51698+01	,85187+01	-,17882+01	,18767+03	,95489+00	,10160+00	,1237+00
9	,26929+03	,56787+02	,48733+01	,91897+01	-,16623+01	,18557+03	,10546+01	,10241+00	,1438+00
10	,22647+03	,54051+02	,43468+01	,97279+01	-,15439+01	,18364+03	,11428+01	,10334+00	,1619+00
11	,20593+03	,51665+02	,41759+01	,10163+02	-,14333+01	,18184+03	,12211+01	,10440+00	,1782+00
12	,18701+03	,49442+02	,40061+01	,10543+02	-,13553+01	,18011+03	,12963+01	,10558+00	,1937+00

AT LINE 21

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48273+03	,79059+02	,61065+01	-,41651-04	-,22983+01	,20029+03	,21847+00	,93724-01	,6890-02
3	,47464+03	,77804+02	,61013+01	,18638+01	-,22734+01	,19883+03	,28168+00	,93782-01	,1654-01
4	,45206+03	,75107+02	,60229+01	,36032+01	-,22030+01	,19668+03	,41193+00	,93958-01	,3391-01
5	,41932+03	,71523+02	,58768+01	,51191+01	-,20994+01	,19412+03	,55326+00	,94251-01	,5621-01
6	,38140+03	,67646+02	,56719+01	,63774+01	-,19773+01	,19140+03	,68714+00	,94661-01	,8045-01

7	,34228+03	,63865+02	,54197+01	,73930+01	-,18489+01	,18875+03	,80814+00	,95188-01	,1044+00
8	,30446+03	,60449+02	,51327+01	,82032+01	-,17220+01	,18625+03	,91549+00	,95833-01	,1270+00
9	,26932+03	,57400+02	,48231+01	,88494+01	-,16007+01	,18394+03	,10102+01	,96594-01	,1475+00
10	,22547+03	,54728+02	,42753+01	,93676+01	-,14867+01	,18180+03	,10937+01	,97473-01	,1662+00
11	,20489+03	,52393+02	,40985+01	,97871+01	-,13802+01	,17983+03	,11677+01	,98469-01	,1829+00
12	,18594+03	,50216+02	,39232+01	,10153+02	-,13051+01	,17793+03	,12387+01	,99582-01	,1989+00

AT LINE 22

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48380+03	,79109+02	,61162+01	-,40049-04	-,22099+01	,20021+03	,21000000	,88338-01	,6973-02
3	,47574+03	,77864+02	,61108+01	,17921+01	-,21860+01	,19866+03	,27074+00	,88393-01	,1696-01
4	,45322+03	,75232+02	,60284+01	,34646+01	-,21183+01	,19632+03	,39576+00	,88559-01	,3475-01
5	,42049+03	,71748+02	,58748+01	,49222+01	-,20187+01	,19352+03	,53115+00	,88835-01	,5753-01
6	,38246+03	,67980+02	,56599+01	,61322+01	-,19013+01	,19056+03	,65909+00	,89222-01	,8228-01
7	,34309+03	,64326+02	,53958+01	,71086+01	-,17778+01	,18766+03	,77440+00	,89719-01	,1068+00
8	,30492+03	,60983+02	,50960+01	,78877+01	-,16558+01	,18494+03	,87643+00	,90326-01	,1298+00
9	,26935+03	,58013+02	,47734+01	,85090+01	-,15391+01	,18242+03	,96618+00	,91044-01	,1509+00
10	,22447+03	,55405+02	,42049+01	,90073+01	-,14295+01	,18010+03	,10452+01	,91872-01	,1699+00
11	,20386+03	,53121+02	,40225+01	,94106+01	-,13271+01	,17796+03	,11151+01	,92810-01	,1871+00
12	,18488+03	,50989+02	,38421+01	,97623+01	-,12549+01	,17591+03	,11819+01	,93859-01	,2035+00

AT LINE 23

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48487+03	,79159+02	,61259+01	-,38447-04	-,21215+01	,20015+03	,20153+00	,83188-01	,7029-02
3	,47685+03	,77924+02	,61203+01	,17204+01	-,20985+01	,19849+03	,25982+00	,83240-01	,1733-01
4	,45438+03	,75357+02	,60339+01	,33260+01	-,20336+01	,19599+03	,37961+00	,83396-01	,3549-01
5	,42166+03	,71972+02	,58729+01	,47254+01	-,19380+01	,19297+03	,50911+00	,83656-01	,5869-01
6	,38352+03	,68315+02	,56479+01	,58869+01	-,18252+01	,18978+03	,63117+00	,84020-01	,8388-01
7	,34390+03	,64767+02	,53720+01	,68243+01	-,17067+01	,18666+03	,74089+00	,84488-01	,1088+00
8	,30537+03	,61517+02	,50594+01	,75722+01	-,15895+01	,18373+03	,83770+00	,85060-01	,1322+00
9	,26939+03	,58625+02	,47242+01	,81686+01	-,14776+01	,18102+03	,92265+00	,85736-01	,1537+00
10	,22347+03	,56082+02	,41357+01	,86470+01	-,13723+01	,17853+03	,99728+00	,86516-01	,1732+00
11	,20283+03	,53849+02	,39479+01	,90342+01	-,12740+01	,17624+03	,10631+01	,87400-01	,1908+00
12	,18383+03	,51762+02	,37626+01	,93718+01	-,12047+01	,17405+03	,11260+01	,88388-01	,2075+00

AT LINE 24

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48595+03	,79210+02	,61356+01	-,36845-04	-,20331+01	,20009+03	,19307+00	,78254-01	,7087-02
3	,47796+03	,77984+02	,61298+01	,16487+01	-,20111+01	,19834+03	,24889+00	,78303-01	,1765-01
4	,45555+03	,75482+02	,60394+01	,31874+01	-,19488+01	,19568+03	,36349+00	,78450-01	,3614-01
5	,42283+03	,72196+02	,58710+01	,45285+01	-,18572+01	,19247+03	,48714+00	,78695-01	,5969-01
6	,38458+03	,68650+02	,56360+01	,56416+01	-,17492+01	,18907+03	,60340+00	,79037-01	,8523-01
7	,34471+03	,65207+02	,53483+01	,65399+01	-,16356+01	,18574+03	,70761+00	,79477-01	,1105+00
8	,30583+03	,62051+02	,50232+01	,72567+01	-,15233+01	,18262+03	,79932+00	,80015-01	,1343+00
9	,26942+03	,59238+02	,46755+01	,78283+01	-,14160+01	,17974+03	,87958+00	,80651-01	,1561+00
10	,22248+03	,56759+02	,40676+01	,82867+01	-,13151+01	,17710+03	,94994+00	,81385-01	,1759+00
11	,20181+03	,54578+02	,38747+01	,86579+01	-,12209+01	,17467+03	,10119+01	,82216-01	,1938+00
12	,18278+03	,52535+02	,36848+01	,89813+01	-,11545+01	,17234+03	,10710+01	,83145-01	,2110+00

AT LINE 25

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48703+03	,79260+02	,61453+01	-,35243-04	-,19447+01	,20004+03	,18462+00	,73519-01	,7057-02
3	,47907+03	,78044+02	,61394+01	,15771+01	-,19236+01	,19820+03	,23798+00	,73565-01	,1793-01
4	,45672+03	,75607+02	,60449+01	,30489+01	-,18641+01	,19540+03	,34740+00	,73703-01	,3670-01
5	,42401+03	,72420+02	,58691+01	,43316+01	-,17765+01	,19201+03	,46524+00	,73932-01	,6053-01
6	,38565+03	,68984+02	,56240+01	,53963+01	-,16731+01	,18842+03	,57576+00	,74254-01	,8634-01
7	,34553+03	,65648+02	,53247+01	,62556+01	-,15644+01	,18491+03	,67456+00	,74668-01	,1119+00
8	,30629+03	,62585+02	,49872+01	,69412+01	-,14571+01	,18162+03	,76127+00	,75173-01	,1360+00

9	,26945+03	,59851+02	,46273+01	,74879+01	-,13544+01	,17858+03	,83696+00	,75770-01	,1581+00
10	,22149+03	,57436+02	,40006+01	,79264+01	-,12580+01	,17580+03	,90317+00	,76460-01	,1782+00
11	,20080+03	,55306+02	,38028+01	,82814+01	-,11679+01	,17324+03	,96137+00	,77241-01	,1964+00
12	,18173+03	,53309+02	,36086+01	,85909+01	-,11043+01	,17078+03	,10167+01	,78114-01	,2138+00

AT LINE 26

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48811+03	,79310+02	,61551+01	-,33641-04	-,18563+01	,20000+03	,17617+00	,68967-01	,7029-02
3	,48018+03	,78103+02	,61489+01	,15054+01	-,18362+01	,19808+03	,22708+00	,69010-01	,1816-01
4	,45789+03	,75732+02	,60504+01	,29103+01	-,17794+01	,19515+03	,33134+00	,69139-01	,3716-01
5	,42519+03	,72644+02	,58672+01	,41347+01	-,16957+01	,19160+03	,44340+00	,69355-01	,6120-01
6	,38671+03	,69319+02	,56121+01	,51510+01	-,15971+01	,18784+03	,54825+00	,69656-01	,8722-01
7	,34635+03	,66089+02	,53012+01	,59713+01	-,14933+01	,18416+03	,64173+00	,70044-01	,1130+00
8	,30674+03	,63120+02	,49515+01	,66287+01	-,13908+01	,18072+03	,72354+00	,70518-01	,1373+00
9	,26948+03	,60464+02	,45796+01	,71476+01	-,12929+01	,17754+03	,79478+00	,71079-01	,1596+00
10	,22051+03	,58113+02	,39347+01	,75662+01	-,12008+01	,17463+03	,85696+00	,71725-01	,1799+00
11	,19978+03	,56034+02	,37323+01	,79049+01	-,11148+01	,17195+03	,91151+00	,72458-01	,1984+00
12	,18069+03	,54082+02	,35339+01	,82004+01	-,10541+01	,16938+03	,96330+00	,73277-01	,2160+00

AT LINE 27

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48920+03	,79360+02	,61649+01	-,32039-04	-,17679+01	,19996+03	,16773+00	,64584-01	,6974-02
3	,48130+03	,78163+02	,61585+01	,14337+01	-,17488+01	,19797+03	,21618+00	,64624-01	,1835-01
4	,45906+03	,75857+02	,60559+01	,27717+01	-,16946+01	,19492+03	,31530+00	,64745-01	,3752-01
5	,42637+03	,72868+02	,58653+01	,39378+01	-,16150+01	,19123+03	,42164+00	,64947-01	,6170-01
6	,38778+03	,69654+02	,56003+01	,49057+01	-,15210+01	,18732+03	,52088+00	,65230-01	,8785-01
7	,34717+03	,66529+02	,52778+01	,56869+01	-,14222+01	,18350+03	,60912+00	,65593-01	,1137+00
8	,30720+03	,63654+02	,49160+01	,63102+01	-,13246+01	,17992+03	,68614+00	,66037-01	,1382+00
9	,26951+03	,61077+02	,45324+01	,68072+01	-,12313+01	,17662+03	,75304+00	,66562-01	,1607+00
10	,21953+03	,58790+02	,38699+01	,72059+01	-,11436+01	,17359+03	,81129+00	,67167-01	,1812+00
11	,19878+03	,56762+02	,36631+01	,75285+01	-,10617+01	,17081+03	,86232+00	,67853-01	,1998+00
12	,17966+03	,54855+02	,34608+01	,78099+01	-,10039+01	,16814+03	,91066+00	,68620-01	,2177+00

AT LINE 28

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49028+03	,79411+02	,61746+01	-,30437-04	-,16795+01	,19994+03	,15929+00	,60359-01	,6890-02
3	,48241+03	,78223+02	,61680+01	,13620+01	-,16613+01	,19787+03	,20529+00	,60396-01	,1849-01
4	,46024+03	,75982+02	,60614+01	,26331+01	-,16099+01	,19472+03	,29929+00	,60509-01	,3780-01
5	,42756+03	,73092+02	,58634+01	,37409+01	-,15342+01	,19091+03	,39994+00	,60698-01	,6205-01
6	,38886+03	,69988+02	,55884+01	,46604+01	-,14450+01	,18687+03	,49364+00	,60962-01	,8824-01
7	,34799+03	,66970+02	,52545+01	,54026+01	-,13511+01	,18293+03	,57672+00	,61302-01	,1142+00
8	,30766+03	,64188+02	,48808+01	,59947+01	-,12584+01	,17923+03	,64905+00	,61717-01	,1387+00
9	,26955+03	,61690+02	,44857+01	,64668+01	-,11697+01	,17582+03	,71172+00	,62207-01	,1613+00
10	,21855+03	,59467+02	,38062+01	,68456+01	-,10864+01	,17269+03	,76617+00	,62773-01	,1819+00
11	,19778+03	,57490+02	,35952+01	,71521+01	-,10086+01	,16981+03	,81377+00	,63414-01	,2007+00
12	,17864+03	,55628+02	,33893+01	,74194+01	-,95370+00	,16705+03	,85880+00	,64131-01	,2187+00

AT LINE 29

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49137+03	,79461+02	,61844+01	-,28835-04	-,15911+01	,19992+03	,15086+00	,56280-01	,6778-02
3	,48353+03	,78283+02	,61776+01	,12903+01	-,15739+01	,19778+03	,19441+00	,56315-01	,1858-01
4	,46142+03	,76106+02	,60669+01	,24945+01	-,15252+01	,19454+03	,28330+00	,56420-01	,3797-01
5	,42875+03	,73317+02	,58614+01	,35440+01	-,14535+01	,19063+03	,37830+00	,56596-01	,6223-01
6	,38993+03	,70323+02	,55766+01	,44152+01	-,13689+01	,18649+03	,46653+00	,56842-01	,8840-01
7	,34681+03	,67410+02	,52313+01	,51182+01	-,12800+01	,18244+03	,54455+00	,57159-01	,1143+00
8	,30812+03	,64722+02	,48458+01	,56792+01	-,11921+01	,17864+03	,61228+00	,57546-01	,1388+00
9	,26950+03	,62302+02	,44394+01	,61265+01	-,11082+01	,17514+03	,67083+00	,58003-01	,1615+00
10	,21750+03	,60144+02	,37436+01	,64853+01	-,10292+01	,17192+03	,72158+00	,58531-01	,1822+00

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11	,19678+03	,58218+02	,35285+01	,67757+01	-,95553+00	,16896+03	,76587+00	,59129-01	,2011+00
12	,17762+03	,56401+02	,33191+01	,70289+01	-,90350+00	,16611+03	,80768+00	,59797-01	,2192+00

AT LINE 30

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49246+03	,79511+02	,61942+01	-,27233-04	-,15028+01	,19991+03	,14244+00	,52337-01	,6639-02
3	,48466+03	,78343+02	,61872+01	,12186+01	-,14865+01	,19770+03	,18354+00	,52370-01	,1863-01
4	,46261+03	,76231+02	,60724+01	,23559+01	-,14405+01	,19439+03	,26734+00	,52468-01	,3806-01
5	,42994+03	,73541+02	,58595+01	,33471+01	-,13727+01	,19040+03	,35674+00	,52632-01	,6224-01
6	,39101+03	,70658+02	,55648+01	,41699+01	-,12929+01	,18617+03	,43955+00	,52861-01	,8831-01
7	,34964+03	,67851+02	,52082+01	,48339+01	-,12089+01	,18204+03	,51259+00	,53155-01	,1141+00
8	,30858+03	,65256+02	,48111+01	,53637+01	-,11259+01	,17816+03	,57582+00	,53515-01	,1386+00
9	,26961+03	,62915+02	,43937+01	,57861+01	-,10466+01	,17458+03	,63035+00	,53940-01	,1612+00
10	,21661+03	,60821+02	,36819+01	,61250+01	-,97206+00	,17128+03	,67751+00	,54431-01	,1819+00
11	,19579+03	,58946+02	,34631+01	,63992+01	-,90244+00	,16825+03	,71860+00	,54987-01	,2008+00
12	,17660+03	,57175+02	,32505+01	,66384+01	-,85331+00	,16533+03	,75731+00	,55608-01	,2190+00

AT LINE 31

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49356+03	,79561+02	,62041+01	-,25631-04	-,14144+01	,19990+03	,13401+00	,48523-01	,6471-02
3	,48578+03	,78403+02	,61968+01	,11470+01	-,13990+01	,19764+03	,17268+00	,48553-01	,1864-01
4	,46380+03	,76356+02	,60779+01	,22173+01	-,13557+01	,19427+03	,25141+00	,48644-01	,3804-01
5	,43113+03	,73765+02	,58576+01	,31502+01	-,12920+01	,19021+03	,33524+00	,48796-01	,6210-01
6	,39209+03	,70992+02	,55530+01	,39246+01	-,12168+01	,18592+03	,41270+00	,49008-01	,8798-01
7	,35046+03	,68292+02	,51852+01	,45495+01	-,11378+01	,18173+03	,48083+00	,49281-01	,1136+00
8	,30904+03	,65791+02	,47766+01	,50481+01	-,10597+01	,17778+03	,53967+00	,49615-01	,1379+00
9	,26964+03	,63528+02	,43484+01	,54458+01	-,98505+00	,17413+03	,59027+00	,50009-01	,1605+00
10	,21565+03	,61498+02	,36213+01	,57647+01	-,91488+00	,17078+03	,63395+00	,50464-01	,1811+00
11	,19480+03	,59674+02	,33988+01	,60228+01	-,84936+00	,16768+03	,67193+00	,50979-01	,2001+00
12	,17559+03	,57948+02	,31833+01	,62479+01	-,80311+00	,16471+03	,70765+00	,51555-01	,2183+00

AT LINE 32

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49465+03	,79612+02	,62139+01	-,24029-04	-,13260+01	,19991+03	,12560+00	,44828-01	,6276-02
3	,48691+03	,78463+02	,62065+01	,10753+01	-,13116+01	,19759+03	,16183+00	,44856-01	,1860-01
4	,46499+03	,76481+02	,60834+01	,20788+01	-,12710+01	,19417+03	,23550+00	,44940-01	,3794-01
5	,43233+03	,73989+02	,58557+01	,29534+01	-,12112+01	,19007+03	,31380+00	,45080-01	,6179-01
6	,39318+03	,71327+02	,55412+01	,36793+01	-,11408+01	,18574+03	,38598+00	,45276-01	,8741-01
7	,35129+03	,68732+02	,51623+01	,42652+01	-,10667+01	,18150+03	,44929+00	,45528-01	,1128+00
8	,30950+03	,66325+02	,47424+01	,47326+01	-,99345+00	,17750+03	,50382+00	,45837-01	,1369+00
9	,26968+03	,64141+02	,43035+01	,51054+01	-,92348+00	,17381+03	,55060+00	,46201-01	,1593+00
10	,21469+03	,62175+02	,35617+01	,54044+01	-,85770+00	,17041+03	,59090+00	,46621-01	,1799+00
11	,19382+03	,60402+02	,33358+01	,56464+01	-,79627+00	,16726+03	,62587+00	,47097-01	,1988+00
12	,17459+03	,58721+02	,31174+01	,58574+01	-,75292+00	,16424+03	,65871+00	,47630-01	,2170+00

AT LINE 33

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49575+03	,79662+02	,62238+01	-,22427-04	-,12376+01	,19992+03	,11719+00	,41246-01	,6053-02
3	,48804+03	,78522+02	,62161+01	,10036+01	-,12241+01	,19756+03	,15098+00	,41272-01	,1851-01
4	,46618+03	,76606+02	,60890+01	,19402+01	-,11863+01	,19410+03	,21962+00	,41349-01	,3774-01
5	,43354+03	,74213+02	,58538+01	,27565+01	-,11305+01	,18997+03	,29243+00	,41478-01	,6131-01
6	,39427+03	,71662+02	,55295+01	,34340+01	-,10647+01	,18562+03	,35939+00	,41658-01	,8660-01
7	,35212+03	,69173+02	,51395+01	,39808+01	-,99556+00	,18135+03	,41796+00	,41890-01	,1117+00
8	,30996+03	,66859+02	,47084+01	,44171+01	-,92722+00	,17733+03	,46827+00	,42174-01	,1355+00
9	,26971+03	,64754+02	,42592+01	,47650+01	-,86192+00	,17361+03	,51133+00	,42509-01	,1577+00
10	,21374+03	,62852+02	,35030+01	,50441+01	-,80052+00	,17017+03	,54834+00	,42896-01	,1781+00
11	,19285+03	,61131+02	,32740+01	,52700+01	-,74319+00	,16699+03	,58040+00	,43334-01	,1969+00
12	,17359+03	,59494+02	,30529+01	,54669+01	-,70272+00	,16393+03	,61045+00	,43824-01	,2151+00

AT LINE 34

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49685+03	,79712+02	,62336+01	-,20825-04	-,11492+01	,19994+03	,10878+00	,37769-01	,5802-02
3	,48918+03	,78582+02	,62258+01	,93190+00	-,11367+01	,19754+03	,14014+00	,37793-01	,1838-01
4	,46738+03	,76731+02	,60945+01	,18016+01	-,11015+01	,19406+03	,20377+00	,37864-01	,3744-01
5	,43474+03	,74437+02	,58519+01	,25596+01	-,10497+01	,18992+03	,27113+00	,37982-01	,6067-01
6	,39536+03	,71996+02	,55178+01	,31887+01	-,98866+00	,18556+03	,33292+00	,38147-01	,8555-01
7	,35296+03	,69614+02	,51169+01	,36965+01	-,92444+00	,18129+03	,38683+00	,38359-01	,1102+00
8	,31042+03	,67393+02	,46747+01	,41016+01	-,86099+00	,17727+03	,43301+00	,38619-01	,1337+00
9	,26974+03	,65366+02	,42153+01	,44247+01	-,80035+00	,17353+03	,47245+00	,38926-01	,1556+00
10	,21279+03	,63528+02	,34454+01	,46838+01	-,74334+00	,17007+03	,50626+00	,39280-01	,1758+00
11	,19187+03	,61859+02	,32133+01	,48935+01	-,69010+00	,16686+03	,53551+00	,39681-01	,1945+00
12	,17260+03	,60268+02	,29898+01	,50764+01	-,65253+00	,16377+03	,56287+00	,40130-01	,2125+00

AT LINE 35

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49796+03	,79762+02	,62435+01	-,19223-04	-,10608+01	,19997+03	,10038+00	,34393-01	,5523-02
3	,49031+03	,78642+02	,62355+01	,86022+00	-,10493+01	,19753+03	,12931+00	,34414-01	,1820-01
4	,46858+03	,76856+02	,61000+01	,16630+01	-,10168+01	,19404+03	,18794+00	,34479-01	,3705-01
5	,43595+03	,74662+02	,58500+01	,23627+01	-,96898+00	,18991+03	,24989+00	,34586-01	,5987-01
6	,39645+03	,72331+02	,55061+01	,29434+01	-,91261+00	,18558+03	,30658+00	,34736-01	,8426-01
7	,35379+03	,70054+02	,50943+01	,34121+01	-,85333+00	,18132+03	,35591+00	,34930-01	,1085+00
8	,31088+03	,67927+02	,46412+01	,37861+01	-,79476+00	,17730+03	,39805+00	,35166-01	,1315+00
9	,26977+03	,65979+02	,41718+01	,40843+01	-,73878+00	,17356+03	,43395+00	,35446-01	,1531+00
10	,21184+03	,64205+02	,33886+01	,43239+01	-,68616+00	,17010+03	,46467+00	,35768-01	,1730+00
11	,19091+03	,62587+02	,31537+01	,45171+01	-,63702+00	,16687+03	,49119+00	,36134-01	,1915+00
12	,17162+03	,61041+02	,29280+01	,46859+01	-,60233+00	,16376+03	,51595+00	,36542-01	,2094+00

AT LINE 36

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49906+03	,79813+02	,62534+01	-,17622-04	-,97237+00	,20000+03	,91990-01	,31110-01	,5216-02
3	,49145+03	,78702+02	,62451+01	,78853+00	-,96182+00	,19753+03	,11849+00	,31129-01	,1797-01
4	,46978+03	,76981+02	,61056+01	,15244+01	-,93206+00	,19405+03	,17213+00	,31188-01	,3657-01
5	,43717+03	,74886+02	,58481+01	,21650+01	-,88823+00	,18995+03	,22872+00	,31285-01	,5891-01
6	,39755+03	,72666+02	,54945+01	,26981+01	-,83656+00	,18565+03	,28037+00	,31421-01	,8273-01
7	,35463+03	,70495+02	,50718+01	,31278+01	-,78222+00	,18144+03	,32518+00	,31596-01	,1064+00
8	,31135+03	,68462+02	,46079+01	,34706+01	-,72853+00	,17744+03	,36338+00	,31810-01	,1289+00
9	,26981+03	,66592+02	,41288+01	,37440+01	-,67722+00	,17372+03	,39583+00	,32063-01	,1501+00
10	,21090+03	,64882+02	,33328+01	,39632+01	-,62898+00	,17026+03	,42354+00	,32354-01	,1697+00
11	,18995+03	,63315+02	,30952+01	,41407+01	-,58393+00	,16703+03	,44743+00	,32685-01	,1880+00
12	,17064+03	,61814+02	,28674+01	,42954+01	-,55214+00	,16391+03	,46969+00	,33054-01	,2057+00

AT LINE 37

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50017+03	,79863+02	,62633+01	-,16020-04	-,88397+00	,20005+03	,83601-01	,27917-01	,4882-02
3	,49259+03	,78762+02	,62549+01	,71685+00	-,87438+00	,19754+03	,10768+00	,27934-01	,1770-01
4	,47098+03	,77106+02	,61111+01	,13858+01	-,84732+00	,19408+03	,15636+00	,27986-01	,3599-01
5	,43838+03	,75110+02	,58462+01	,19689+01	-,80748+00	,19004+03	,20761+00	,28074-01	,5778-01
6	,39865+03	,73000+02	,54829+01	,24529+01	-,76051+00	,18580+03	,25427+00	,28196-01	,8096-01
7	,35547+03	,70936+02	,50494+01	,28435+01	-,71111+00	,18163+03	,29466+00	,28353-01	,1040+00
8	,31181+03	,68996+02	,45749+01	,31551+01	-,66230+00	,17769+03	,32899+00	,28545-01	,1260+00
9	,26984+03	,67205+02	,40862+01	,34036+01	-,61565+00	,17399+03	,35808+00	,28771-01	,1466+00
10	,20997+03	,65559+02	,32780+01	,36029+01	-,57180+00	,17055+03	,38288+00	,29033-01	,1659+00
11	,18899+03	,64043+02	,30378+01	,37643+01	-,53085+00	,16733+03	,40421+00	,29330-01	,1839+00
12	,16966+03	,62587+02	,28061+01	,39049+01	-,50194+00	,16422+03	,42405+00	,29661-01	,2014+00

AT LINE 38

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50120+03	,79913+02	,62733+01	-,14413-04	-,79557+00	,20010+03	,75217-01	,24807-01	,4519-02
3	,49374+03	,78822+02	,62646+01	,54516+00	-,78695+00	,19757+03	,96873-01	,24823-01	,1739-01
4	,47219+03	,77231+02	,61167+01	,12473+01	-,76259+00	,19415+03	,14061+00	,24869-01	,3532-01
5	,43960+03	,75334+02	,58442+01	,17720+01	-,72673+00	,19017+03	,18656+00	,24947-01	,5649-01
6	,39975+03	,73335+02	,54713+01	,22076+01	-,68446+00	,18601+03	,22831+00	,25056-01	,7894-01
7	,35631+03	,71376+02	,50271+01	,25591+01	-,64000+00	,18192+03	,26434+00	,25195-01	,1013+00
8	,31228+03	,69530+02	,45422+01	,28396+01	-,59607+00	,17803+03	,29488+00	,25366-01	,1226+00
9	,26987+03	,67818+02	,40441+01	,30632+01	-,55409+00	,17439+03	,32070+00	,25567-01	,1428+00
10	,20903+03	,66236+02	,32240+01	,32426+01	-,51462+00	,17098+03	,34266+00	,25800-01	,1616+00
11	,18804+03	,64771+02	,29815+01	,33878+01	-,47776+00	,16778+03	,36153+00	,26063-01	,1793+00
12	,16869+03	,63360+02	,27500+01	,35144+01	-,45175+00	,16468+03	,37905+00	,26358-01	,1964+00

AT LINE 39

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50240+03	,79963+02	,62832+01	-,12816-04	-,70718+00	,20016+03	,66838-01	,21778-01	,4128-02
3	,49480+03	,78882+02	,62743+01	,57348+00	-,69951+00	,19761+03	,86076-01	,21792-01	,1703-01
4	,47341+03	,77356+02	,61223+01	,11087+01	-,67786+00	,19423+03	,12488+00	,21833-01	,3455-01
5	,44083+03	,75558+02	,58423+01	,15751+01	-,64598+00	,19034+03	,16558+00	,21901-01	,5503-01
6	,40086+03	,73670+02	,54597+01	,19623+01	-,60841+00	,18628+03	,20246+00	,21996-01	,7669-01
7	,35715+03	,71817+02	,50049+01	,22748+01	-,56889+00	,18229+03	,23421+00	,22119-01	,9822-01
8	,31274+03	,70064+02	,45096+01	,25241+01	-,52984+00	,17849+03	,26105+00	,22268-01	,1189+00
9	,26990+03	,68431+02	,40024+01	,27229+01	-,49252+00	,17490+03	,28369+00	,22445-01	,1384+00
10	,20811+03	,66913+02	,31709+01	,28823+01	-,45744+00	,17154+03	,30290+00	,22649-01	,1568+00
11	,18709+03	,65499+02	,29262+01	,30114+01	-,42468+00	,16837+03	,31937+00	,22881-01	,1741+00
12	,16773+03	,64134+02	,26931+01	,31239+01	-,40156+00	,16529+03	,33465+00	,23140-01	,1909+00

AT LINE 40

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50351+03	,80013+02	,62932+01	-,11214-04	-,61878+00	,20023+03	,58465-01	,18825-01	,3710-02
3	,49603+03	,78941+02	,62841+01	,50179+00	-,61207+00	,19767+03	,75288-01	,18837-01	,1662-01
4	,47462+03	,77481+02	,61278+01	,97008+00	-,59313+00	,19435+03	,10918+00	,18872-01	,3369-01
5	,44205+03	,75782+02	,58404+01	,13782+01	-,56524+00	,19057+03	,14467+00	,18931-01	,5341-01
6	,40197+03	,74004+02	,54481+01	,17170+01	-,53236+00	,18663+03	,17674+00	,19014-01	,7420-01
7	,35800+03	,72258+02	,49828+01	,19904+01	-,49778+00	,18275+03	,20427+00	,19119-01	,9486-01
8	,31321+03	,70598+02	,44773+01	,22086+01	-,46361+00	,17904+03	,22749+00	,19249-01	,1148+00
9	,26993+03	,69043+02	,39612+01	,23825+01	-,43096+00	,17554+03	,24703+00	,19402-01	,1337+00
10	,20718+03	,67590+02	,31187+01	,25221+01	-,40026+00	,17224+03	,26357+00	,19578-01	,1515+00
11	,18615+03	,66227+02	,28719+01	,26350+01	-,37159+00	,16911+03	,27774+00	,19778-01	,1683+00
12	,16677+03	,64907+02	,26374+01	,27335+01	-,35136+00	,16606+03	,29084+00	,20002-01	,1848+00

AT LINE 41

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50463+03	,80064+02	,63032+01	-,96117-05	-,53038+00	,20030+03	,50097-01	,15944-01	,3264-02
3	,49719+03	,79001+02	,62938+01	,43011+00	-,52463+00	,19773+03	,64508-01	,15954-01	,1617-01
4	,47584+03	,77606+02	,61334+01	,83150+00	-,50839+00	,19449+03	,93509-01	,15984-01	,3273-01
5	,44328+03	,76006+02	,58385+01	,11813+01	-,48449+00	,19083+03	,12381+00	,16034-01	,5163-01
6	,40308+03	,74339+02	,54366+01	,14717+01	-,45631+00	,18703+03	,15113+00	,16104-01	,7146-01
7	,35885+03	,72698+02	,49608+01	,17061+01	-,42667+00	,18329+03	,17453+00	,16194-01	,9119-01
8	,31368+03	,71133+02	,44452+01	,18931+01	-,39738+00	,17970+03	,19420+00	,16303-01	,1102+00
9	,26997+03	,69656+02	,39203+01	,20422+01	-,36939+00	,17629+03	,21072+00	,16433-01	,1284+00
10	,20626+03	,68267+02	,30674+01	,21618+01	-,34308+00	,17306+03	,22468+00	,16582-01	,1457+00
11	,18521+03	,66955+02	,28187+01	,22586+01	-,31851+00	,16999+03	,23661+00	,16752-01	,1620+00
12	,16582+03	,65680+02	,25829+01	,23430+01	-,30117+00	,16699+03	,24763+00	,16941-01	,1781+00

AT LINE 42

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50575+03	,80114+02	,63132+01	-,80098-05	-,44199+00	,20038+03	,41734-01	,13133-01	,2789-02

3	,49834+03	,79061+02	,63036+01	,35842+00	-,43719+00	,19781+03	,53736-01	,13141-01	,1567-01
4	,47706+03	,77731+02	,61390+01	,59292+00	-,42366+00	,19466+03	,77060-01	,13165-01	,3168-01
5	,44452+03	,76231+02	,58366+01	,98445+00	-,40374+00	,19114+03	,10302+00	,13206-01	,4969-01
6	,40420+03	,74674+02	,54251+01	,12264+01	-,38026+00	,18751+03	,12565+00	,13264-01	,6849-01
7	,35969+03	,73139+02	,49389+01	,14217+01	-,35556+00	,18392+03	,14498+00	,13338-01	,8720-01
8	,31415+03	,71667+02	,44134+01	,15775+01	-,33115+00	,18047+03	,16118+00	,13428-01	,1053+00
9	,27000+03	,70269+02	,38799+01	,17018+01	-,30783+00	,17717+03	,17476+00	,13535-01	,1227+00
10	,20534+03	,68944+02	,30169+01	,18015+01	-,28590+00	,17402+03	,18621+00	,13658-01	,1393+00
11	,18428+03	,67683+02	,27664+01	,18821+01	-,26542+00	,17102+03	,19598+00	,13797-01	,1552+00
12	,16487+03	,66453+02	,25294+01	,19525+01	-,25097+00	,16807+03	,20499+00	,13953-01	,1707+00

AT LINE 43

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50688+03	,80164+02	,63232+01	-,54078-05	-,35359+00	,20047+03	,33377-01	,10386-01	,2287-02
3	,49950+03	,79121+02	,63134+01	,28674+00	-,34975+00	,19790+03	,42973-01	,10393-01	,1513-01
4	,47829+03	,77856+02	,61446+01	,55433+00	-,33893+00	,19485+03	,62237-01	,10412-01	,3053-01
5	,44575+03	,76455+02	,58347+01	,78756+00	-,32299+00	,19150+03	,82292-01	,10445-01	,4758-01
6	,40532+03	,75008+02	,54136+01	,98114+00	-,30420+00	,18805+03	,10029+00	,10490-01	,6527-01
7	,36055+03	,73580+02	,49171+01	,11374+01	-,28444+00	,18464+03	,11561+00	,10548-01	,8290-01
8	,31461+03	,72201+02	,43818+01	,12620+01	-,26492+00	,18133+03	,12843+00	,10620-01	,1001+00
9	,27003+03	,70882+02	,38399+01	,13614+01	-,24626+00	,17816+03	,13914+00	,10704-01	,1166+00
10	,20443+03	,69621+02	,29672+01	,14412+01	-,22872+00	,17512+03	,14816+00	,10802-01	,1325+00
11	,18335+03	,68412+02	,27151+01	,15057+01	-,21234+00	,17219+03	,15584+00	,10912-01	,1478+00
12	,16393+03	,67227+02	,24771+01	,15620+01	-,20078+00	,16931+03	,16291+00	,11035-01	,1628+00

AT LINE 44

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50800+03	,80214+02	,63332+01	-,48059-05	-,26519+00	,20057+03	,25025-01	,77024-02	,1757-02
3	,50066+03	,79181+02	,63232+01	,21505+00	-,26232+00	,19801+03	,32217-01	,77073-02	,1454-01
4	,47951+03	,77981+02	,61501+01	,41575+00	-,25420+00	,19507+03	,46640-01	,77217-02	,2929-01
5	,44699+03	,76679+02	,58328+01	,59067+00	-,24224+00	,19190+03	,61626-01	,77458-02	,4530-01
6	,40644+03	,75343+02	,54021+01	,73586+00	-,22815+00	,18865+03	,75039-01	,77795-02	,6182-01
7	,36140+03	,74020+02	,48954+01	,85304+00	-,21333+00	,18544+03	,86433-01	,78228-02	,7827-01
8	,31508+03	,72735+02	,43504+01	,94653+00	-,19869+00	,18231+03	,95939-01	,78758-02	,9437-01
9	,27006+03	,71495+02	,38004+01	,10211+01	-,18470+00	,17928+03	,10386+00	,79383-02	,1100+00
10	,20352+03	,70298+02	,29103+01	,10809+01	-,17154+00	,17634+03	,11052+00	,80105-02	,1251+00
11	,18243+03	,69140+02	,26648+01	,11293+01	-,15925+00	,17350+03	,11618+00	,80924-02	,1398+00
12	,16300+03	,68000+02	,24259+01	,11715+01	-,15058+00	,17070+03	,12138+00	,81839-02	,1543+00

AT LINE 45

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50913+03	,80265+02	,63433+01	-,32039-05	-,17679+00	,20068+03	,16678-01	,50786-02	,1199-02
3	,50182+03	,79241+02	,63330+01	,14337+00	-,17489+00	,19813+03	,21470-01	,50817-02	,1391-01
4	,48074+03	,78106+02	,61557+01	,27717+00	-,16946+00	,19532+03	,31068-01	,50913-02	,2795-01
5	,44824+03	,76903+02	,58309+01	,39378+00	-,16150+00	,19235+03	,41022-01	,51071-02	,4287-01
6	,40756+03	,75677+02	,53907+01	,49057+00	-,15210+00	,18933+03	,49910-01	,51293-02	,5812-01
7	,36225+03	,74461+02	,48738+01	,56869+00	-,14222+00	,18632+03	,57439-01	,51579-02	,7333-01
8	,31555+03	,73269+02	,43192+01	,63102+00	-,13246+00	,18338+03	,63705-01	,51928-02	,8831-01
9	,27010+03	,72107+02	,37612+01	,68072+00	-,12313+00	,18051+03	,68916-01	,52341-02	,1030+00
10	,20262+03	,70975+02	,28703+01	,72059+00	-,11436+00	,17770+03	,73284-01	,52817-02	,1173+00
11	,18151+03	,69868+02	,26153+01	,75285+00	-,10617+00	,17496+03	,76992-01	,53357-02	,1313+00
12	,16206+03	,68773+02	,23757+01	,78099+00	-,10039+00	,17224+03	,80393-01	,53960-02	,1451+00

AT LINE 46

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,51026+03	,80315+02	,63533+01	-,16020-05	-,88397-01	,20079+03	,83364-02	,25119-02	,6137-03
3	,50299+03	,79301+02	,63429+01	,71685-01	-,87438-01	,19826+03	,10731-01	,25135-02	,1323-01
4	,48198+03	,78231+02	,61613+01	,13858+00	-,84732-01	,19559+03	,15521-01	,25182-02	,2652-01

5	,44949+03	,77127+02	,58290+01	,19689+00	-,80748-01	,19284+03	,20480-01	,25260-02	,4026-01
6	,40869+03	,76012+02	,53793+01	,24529+00	-,76051-01	,19006+03	,24897-01	,25370-02	,5418-01
7	,36311+03	,74902+02	,48523+01	,29435+00	-,71111-01	,18730+03	,28629-01	,25511-02	,6008-01
8	,31602+03	,73804+02	,42883+01	,31551+00	-,66230-01	,18456+03	,31727-01	,25684-02	,8185-01
9	,27013+03	,72720+02	,37224+01	,34036+00	-,61565-01	,18186+03	,34296-01	,25888-02	,9545-01
10	,20172+03	,71652+02	,28230+01	,36029+00	-,57180-01	,17920+03	,36446-01	,26124-02	,1089+00
11	,18059+03	,70596+02	,25668+01	,37643+00	-,53085-01	,17656+03	,38268-01	,26391-02	,1222+00
12	,16114+03	,69546+02	,23266+01	,39049+00	-,50195-01	,17394+03	,39937-01	,26689-02	,1354+00

AT LINE 47

	P	T	RHO	U	V	E	M	Z	CF	CH
2	,51140+03	,60000+01	,85233+02	-,90949-12	-,89407-07	,15000+02	,84290-08	,00000	-.1024-08	.1060-01
3	,50416+03	,60000+01	,84026+02	,59605-07	-,59605-07	,15000+02	,79970-08	,00000	.4578-04	.1045-01
4	,48322+03	,60000+01	,80536+02	,17881-06	-,59605-07	,15000+02	,17996-07	,00000	.8834-04	.1028-01
5	,45073+03	,60000+01	,75122+02	,11921-06	-,89407-07	,15000+02	,14319-07	,00000	.1251-03	.1009-01
6	,40982+03	,60000+01	,68304+02	,23842-06	-,59605-07	,15000+02	,23771-07	,00000	.1552-03	.9888-02
7	,36397+03	,60000+01	,60662+02	,23842-06	-,59605-07	,15000+02	,23929-07	,00000	.1789-03	.9677-02
8	,31650+03	,60000+01	,52749+02	,23842-06	-,29802-07	,15000+02	,23553-07	,00000	.1972-03	.9459-02
9	,27016+03	,60000+01	,45027+02	,23842-06	-,59605-07	,15000+02	,24254-07	,00000	.2110-03	.9234-02
10	,20082+03	,60000+01	,33471+02	,23842-06	-,59605-07	,15000+02	,24422-07	,00000	.2214-03	.9004-02
11	,17968+03	,60000+01	,29947+02	,23842-06	-,29802-07	,15000+02	,24045-07	,00000	.2290-03	.8770-02
12	,16022+03	,60000+01	,26703+02	,23842-06	-,29802-07	,15000+02	,24216-07	,00000	.2349-03	.8531-02

STEP 0, TIME= ,7948-04, STANDOFF DISTANCE= ,3531+00
WMAX= ,0000 , WMIN= ,0000 , WRANGE= ,0000 , MAXIM PRESS= ,5114+03

* DIVIDE CHECK AT 026605

* DIVIDE CHECK AT 026627

* DIVIDE CHECK AT 026647

* DIVIDE CHECK AT 026661

* DIVIDE CHECK AT 026605

* DIVIDE CHECK AT 026627

* DIVIDE CHECK AT 026647

* DIVIDE CHECK AT 026661

* DIVIDE CHECK AT 026605

* DIVIDE CHECK AT 026627

STEP 1, TIME= ,1980-03, STANDOFF DISTANCE= ,3530+00
WMAX= -,5780-01, WMIN= -,1298+00, WRANGE= ,7204-01, MAXIM PRESS= ,5117+03

STEP 2, TIME= ,3166-03, STANDOFF DISTANCE= ,3529+00
WMAX= -,1077+00, WMIN= -,3186+00, WRANGE= ,2109+00, MAXIM PRESS= ,5122+03

STEP 3, TIME= ,4353-03, STANDOFF DISTANCE= ,3525+00
WMAX= -,1595+00, WMIN= -,5453+00, WRANGE= ,3858+00, MAXIM PRESS= ,5128+03

STEP 4, TIME= ,5540-03, STANDOFF DISTANCE= ,3521+00
WMAX= -,2131+00, WMIN= -,7918+00, WRANGE= ,5786+00, MAXIM PRESS= ,5136+03

AT STEP 400 DT= ,2286129-03 AT N= 44, M= 3,
TIME= ,3480710-01

	Y	SHOCK VELOCITY	PSI	ZS	YS
2	,00000	=,51116+00	,00000	,11380+01	,17115-09
3	,14000+00	=,50125+00	,30627-01	,11272+01	,16400+00
4	,28000+00	=,61047+00	,52690-01	,11011+01	,32720+00
5	,42000+00	=,59632+00	,76801-01	,10538+01	,48515+00
6	,56000+00	=,66894+00	,10493+00	,99668+00	,63928+00
7	,70000+00	=,71565+00	,10552+00	,92567+00	,78602+00
8	,84000+00	=,78269+00	,12275+00	,84402+00	,92519+00
9	,98000+00	=,82353+00	,12331+00	,75761+00	,10602+01
10	,11200+01	=,83717+00	,10803+00	,66117+00	,11856+01
11	,12600+01	=,88829+00	,11289+00	,55984+00	,13052+01
12	,14000+01	=,93420+00	,11697+00	,45525+00	,14203+01

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,44293+03	,74794+02	,59220+01	,23384-07	=,44049+01	,19669+03	,43047+00	,17251+00	,3483-01
3	,43802+03	,73975+02	,59212+01	,26834+01	=,42935+01	,19775+03	,49752+00	,17313+00	,3395-01
4	,41793+03	,70626+02	,59174+01	,53394+01	=,41194+01	,19930+03	,67820+00	,18107+00	,4034-01
5	,39661+03	,67074+02	,59131+01	,75957+01	=,37129+01	,20342+03	,87247+00	,18787+00	,3832-01
6	,37189+03	,62954+02	,59074+01	,93686+01	=,32790+01	,20665+03	,10573+01	,20260+00	,4152-01
7	,34009+03	,57653+02	,58989+01	,11237+02	=,29701+01	,21168+03	,12938+01	,21733+00	,4246-01
8	,31597+03	,53633+02	,58913+01	,12464+02	=,25761+01	,21508+03	,14688+01	,23223+00	,4466-01
9	,28933+03	,49193+02	,58815+01	,13695+02	=,23195+01	,21944+03	,16737+01	,25185+00	,4495-01
10	,25966+03	,44248+02	,58683+01	,14947+02	=,22428+01	,22484+03	,19203+01	,26692+00	,4334-01
11	,24038+03	,41035+02	,58579+01	,15695+02	=,20278+01	,22781+03	,20879+01	,28220+00	,4421-01
12	,22361+03	,38239+02	,58476+01	,16319+02	=,18383+01	,23043+03	,22444+01	,29864+00	,4481-01

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,46130+03	,83995+02	,54920+01	,00000	=,37862+01	,21715+03	,34915+00	,15218+00	=,7065-01
3	,45750+03	,77671+02	,58903+01	,25419+01	=,36448+01	,20405+03	,42612+00	,15272+00	=,1575-02
4	,43830+03	,73249+02	,59837+01	,51128+01	=,33702+01	,20187+03	,60471+00	,15973+00	,2189-01
5	,41293+03	,73714+02	,56018+01	,73926+01	=,31319+01	,21651+03	,79032+00	,16573+00	=,3182-01
6	,38635+03	,69621+02	,55493+01	,90385+01	=,27460+01	,21867+03	,95682+00	,17872+00	=,2494-01
7	,35316+03	,63237+02	,55848+01	,10859+02	=,24662+01	,22005+03	,11831+01	,19172+00	=,7129-02
8	,32736+03	,58690+02	,55778+01	,12077+02	=,21626+01	,22198+03	,13535+01	,20486+00	,2150-02
9	,29755+03	,54612+02	,54485+01	,13155+02	=,19597+01	,22498+03	,15211+01	,22217+00	,6012-02
10	,26676+03	,49922+02	,53436+01	,14371+02	=,18991+01	,22987+03	,17340+01	,23546+00	,5272-02
11	,24809+03	,46531+02	,53317+01	,15192+02	=,17092+01	,23319+03	,18941+01	,24895+00	,5546-02
12	,22878+03	,43187+02	,52975+01	,15941+02	=,15358+01	,23621+03	,20596+01	,26345+00	,6678-02

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,47328+03	,10229+03	,46267+01	,00000	=,32504+01	,26102+03	,27162+00	,13719+00	=,2916+00
3	,46970+03	,83728+02	,56098+01	,28287+01	=,31195+01	,21819+03	,38895+00	,13768+00	=,7337-01
4	,45042+03	,82719+02	,54451+01	,48413+01	=,29195+01	,22278+03	,52535+00	,14400+00	=,8610-01
5	,42340+03	,77084+02	,54927+01	,74282+01	=,26543+01	,22382+03	,75933+00	,14941+00	=,6978-01
6	,39614+03	,74036+02	,53506+01	,89282+01	=,23293+01	,22766+03	,90631+00	,16112+00	=,7259-01
7	,36144+03	,68307+02	,52915+01	,10709+02	=,20687+01	,23025+03	,11154+01	,17283+00	=,6143-01
8	,33401+03	,63865+02	,52300+01	,12065+02	=,18112+01	,23409+03	,12903+01	,18468+00	=,5929-01
9	,30214+03	,60034+02	,50328+01	,13126+02	=,16492+01	,23759+03	,14430+01	,20029+00	=,5811-01
10	,27046+03	,55563+02	,48676+01	,14274+02	=,16112+01	,24208+03	,16287+01	,21227+00	=,5819-01
11	,25206+03	,52146+02	,48338+01	,15098+02	=,14356+01	,24537+03	,17750+01	,22442+00	=,5773-01
12	,23314+03	,48751+02	,47822+01	,15856+02	=,12741+01	,24840+03	,19255+01	,23750+00	=,5642-01

AT LINE 5

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48552+03	,67013+02	,72451+01	,00000	-,28255+01	,17152+03	,29171+00	,12531+00	,1519+00
3	,48037+03	,66335+02	,72416+01	,22237+01	-,27588+01	,17211+03	,36770+00	,12576+00	,1523+00
4	,46030+03	,66652+02	,69060+01	,43036+01	-,25952+01	,17926+03	,52025+00	,13153+00	,1257+00
5	,43295+03	,60633+02	,71404+01	,53905+01	-,23641+01	,17480+03	,73955+00	,13647+00	,1630+00
6	,40405+03	,59877+02	,67481+01	,77129+01	-,21165+01	,16167+03	,87354+00	,14717+00	,1412+00
7	,36842+03	,56374+02	,65352+01	,91997+01	-,18792+01	,18502+03	,10569+01	,15787+00	,1418+00
8	,33913+03	,53329+02	,63592+01	,10543+02	-,16866+01	,19032+03	,12357+01	,16869+00	,1338+00
9	,30555+03	,50850+02	,60089+01	,11582+02	-,15676+01	,19543+03	,13853+01	,18294+00	,1244+00
10	,27377+03	,47902+02	,57152+01	,12596+02	-,15243+01	,20025+03	,15494+01	,19389+00	,1178+00
11	,25561+03	,45782+02	,55831+01	,13367+02	-,13602+01	,20472+03	,16783+01	,20499+00	,1094+00
12	,23685+03	,43541+02	,54398+01	,14099+02	-,12043+01	,20897+03	,18124+01	,21693+00	,1023+00

AT LINE 6

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49271+03	,57657+02	,85454+01	,00000	-,26164+01	,14757+03	,29121+00	,11547+00	,2704+00
3	,48815+03	,62587+02	,77995+01	,19182+01	-,25347+01	,16152+03	,33958+00	,11588+00	,2033+00
4	,46756+03	,62476+02	,74838+01	,41764+01	-,23552+01	,16769+03	,51268+00	,12120+00	,1817+00
5	,43822+03	,61078+02	,71748+01	,61719+01	-,21728+01	,17410+03	,70759+00	,12575+00	,1639+00
6	,40844+03	,57891+02	,70552+01	,73565+01	-,19657+01	,17372+03	,84582+00	,13561+00	,1766+00
7	,37116+03	,55320+02	,67093+01	,86512+01	-,17526+01	,17726+03	,10030+01	,14547+00	,1731+00
8	,34076+03	,52929+02	,64381+01	,99974+01	-,15785+01	,18354+03	,11758+01	,15544+00	,1593+00
9	,30644+03	,50946+02	,60149+01	,11129+02	-,14712+01	,19038+03	,13293+01	,16858+00	,1420+00
10	,27468+03	,48476+02	,56664+01	,12126+02	-,14294+01	,19573+03	,14821+01	,17866+00	,1318+00
11	,25685+03	,46533+02	,55197+01	,12834+02	-,12714+01	,19950+03	,15979+01	,18889+00	,1253+00
12	,23860+03	,44484+02	,53637+01	,13510+02	-,11208+01	,20309+03	,17178+01	,19990+00	,1198+00

AT LINE 7

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49680+03	,68454+02	,72865+01	,00000	-,24373+01	,17411+03	,24897+00	,10707+00	,1376+00
3	,49424+03	,70812+02	,69796+01	,20150+01	-,23400+01	,18180+03	,31019+00	,10745+00	,1019+00
4	,47318+03	,69954+02	,67642+01	,41765+01	-,21557+01	,18593+03	,47493+00	,11238+00	,9028-01
5	,44211+03	,67065+02	,65922+01	,63113+01	-,19933+01	,18956+03	,68305+00	,11660+00	,8763-01
6	,41152+03	,64387+02	,63914+01	,74928+01	-,18246+01	,19070+03	,81225+00	,12575+00	,9310-01
7	,37374+03	,63699+02	,58673+01	,87702+01	-,15974+01	,19898+03	,94399+00	,13489+00	,6612-01
8	,34279+03	,60603+02	,56564+01	,10073+02	-,14211+01	,20325+03	,11045+01	,14414+00	,6193-01
9	,30788+03	,57208+02	,53817+01	,11238+02	-,13230+01	,20705+03	,12644+01	,15631+00	,6052-01
10	,27600+03	,54164+02	,50957+01	,12260+02	-,12898+01	,21139+03	,14157+01	,16567+00	,5589-01
11	,25828+03	,52107+02	,49568+01	,12952+02	-,11373+01	,21480+03	,15223+01	,17515+00	,5111-01
12	,24030+03	,49954+02	,48105+01	,13614+02	-,99164+00	,21805+03	,16322+01	,18536+00	,4721-01

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50316+03	,71895+02	,69985+01	,00000	-,22831+01	,18234+03	,22756+00	,99743-01	,9613-01
3	,49856+03	,70755+02	,70462+01	,19649+01	-,21860+01	,18121+03	,29533+00	,10010+00	,1042+00
4	,47707+03	,69234+02	,68907+01	,39259+01	-,20088+01	,18281+03	,44793+00	,10469+00	,1039+00
5	,44509+03	,64055+02	,69485+01	,59555+01	-,18678+01	,17962+03	,65910+00	,10862+00	,1337+00
6	,41389+03	,64575+02	,64095+01	,73192+01	-,17211+01	,18970+03	,79078+00	,11714+00	,9599-01
7	,37611+03	,63665+02	,59077+01	,84341+01	-,14931+01	,19584+03	,90725+00	,12566+00	,7739-01
8	,34442+03	,60702+02	,56740+01	,95574+01	-,13346+01	,19832+03	,10468+01	,13427+00	,7913-01
9	,30084+03	,57076+02	,54110+01	,10671+02	-,12485+01	,20041+03	,12019+01	,14562+00	,8460-01
10	,27667+03	,53979+02	,51256+01	,11713+02	-,12171+01	,20428+03	,13546+01	,15433+00	,8183-01
11	,25907+03	,52248+02	,49585+01	,12406+02	-,10701+01	,20814+03	,14559+01	,16316+00	,7426-01
12	,24120+03	,50387+02	,47869+01	,13074+02	-,92828+00	,21187+03	,15606+01	,17267+00	,6763-01

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50598+03	,69158+02	,73162+01	,00000	-,21799+01	,17527+03	,22154+00	,93244-01	,1310+00
3	,50150+03	,67707+02	,74061+01	,10838+01	-,20857+01	,17322+03	,28868+00	,93577-01	,1435+00
4	,47987+03	,67526+02	,71064+01	,35981+01	-,19112+01	,17712+03	,41903+00	,97869-01	,1302+00
5	,44756+03	,65168+02	,68657+01	,57443+01	-,17649+01	,18102+03	,62904+00	,10155+00	,1247+00
6	,41612+03	,63415+02	,65618+01	,71801+01	-,16362+01	,18565+03	,78156+00	,10951+00	,1145+00
7	,37625+03	,61604+02	,61400+01	,81288+01	-,14231+01	,18806+03	,88861+00	,11747+00	,1124+00
8	,34550+03	,60642+02	,56986+01	,91712+01	-,12724+01	,19447+03	,10049+01	,12552+00	,9302-01
9	,30929+03	,58715+02	,52677+01	,10321+02	-,11855+01	,20075+03	,11459+01	,13613+00	,7753-01
10	,27704+03	,55618+02	,49812+01	,11366+02	-,11540+01	,20430+03	,12947+01	,14427+00	,7593-01
11	,25961+03	,53766+02	,48285+01	,12039+02	-,10112+01	,20735+03	,13920+01	,15253+00	,7170-01
12	,24199+03	,51810+02	,46708+01	,12678+02	-,87407+00	,21027+03	,14921+01	,16142+00	,6826-01

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50498+03	,73571+02	,69182+01	,00000	-,20932+01	,18612+03	,20625+00	,87406-01	,7676-01
3	,50455+03	,71805+02	,70266+01	,20353+01	-,20046+01	,18359+03	,28492+00	,87718-01	,9201-01
4	,48304+03	,73566+02	,65660+01	,34471+01	-,18256+01	,19152+03	,38435+00	,91741-01	,5755-01
5	,45018+03	,72947+02	,61714+01	,57973+01	-,16532+01	,20054+03	,59654+00	,95188-01	,2770-01
6	,41849+03	,67603+02	,61904+01	,72961+01	-,15487+01	,19682+03	,76669+00	,10265+00	,5991-01
7	,38014+03	,66197+02	,57426+01	,83302+01	-,13417+01	,20109+03	,87646+00	,11011+00	,4974-01
8	,34652+03	,66145+02	,52389+01	,93516+01	-,11868+01	,20979+03	,97959+00	,11766+00	,1899-01
9	,30967+03	,65181+02	,47508+01	,10487+02	-,10982+01	,21855+03	,11038+01	,12760+00	-,8715-02
10	,27739+03	,61899+02	,44814+01	,11534+02	-,10711+01	,22183+03	,12443+01	,13524+00	-,8719-02
11	,26009+03	,59711+02	,43557+01	,12196+02	-,93027+00	,22408+03	,13378+01	,14298+00	-,8953-02
12	,24269+03	,57450+02	,42244+01	,12829+02	-,79576+00	,22624+03	,14333+01	,15131+00	-,8967-02

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,51255+03	,79820+02	,64214+01	,00000	-,19975+01	,20154+03	,18896+00	,82106-01	-,3076-03
3	,50790+03	,77980+02	,65132+01	,22580+01	-,19206+01	,19934+03	,28371+00	,82399-01	,1406-01
4	,48647+03	,79917+02	,60872+01	,34698+01	-,17448+01	,20733+03	,36718+00	,86178-01	-,2124-01
5	,45294+03	,76858+02	,58932+01	,55655+01	-,15564+01	,20884+03	,55712+00	,89417-01	-,1573-01
6	,42061+03	,72645+02	,57899+01	,73455+01	-,14650+01	,20966+03	,74272+00	,96427-01	-,3661-02
7	,38154+03	,71605+02	,53284+01	,85835+01	-,12626+01	,21665+03	,86651+00	,10344+00	-,2480-01
8	,34725+03	,70012+02	,49599+01	,95077+01	-,11133+01	,22085+03	,96690+00	,11053+00	-,3407-01
9	,31007+03	,68309+02	,45392+01	,10447+02	-,10292+01	,22587+03	,10734+01	,11987+00	-,4586-01
10	,27776+03	,65439+02	,42446+01	,11492+02	-,99944+00	,23013+03	,12052+01	,12704+00	-,5080-01
11	,26052+03	,63403+02	,41089+01	,12170+02	-,85999+00	,23293+03	,12950+01	,13431+00	-,5354-01
12	,24320+03	,61263+02	,39698+01	,12823+02	-,72577+00	,23563+03	,13868+01	,14214+00	-,5553-01

AT LINE 12

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,51681+03	,79194+02	,65260+01	,00000	-,19017+01	,19979+03	,18061+00	,77254-01	,8148-02
3	,51176+03	,78493+02	,65198+01	,22790+01	-,18383+01	,20052+03	,27931+00	,77529-01	,8058-02
4	,48994+03	,78841+02	,62145+01	,35021+01	-,16815+01	,20465+03	,36977+00	,81085-01	-,7870-02
5	,45588+03	,73775+02	,61794+01	,50385+01	-,14932+01	,19824+03	,51709+00	,84132-01	,3291-01
6	,42259+03	,72809+02	,58042+01	,71066+01	-,13967+01	,20825+03	,71736+00	,90728-01	,7846-03
7	,38281+03	,71189+02	,53774+01	,83748+01	-,12127+01	,21378+03	,84764+00	,97325-01	-,1311-01
8	,34797+03	,68082+02	,51110+01	,92437+01	-,10780+01	,21351+03	,95324+00	,10400+00	-,1111-02
9	,31069+03	,65676+02	,47306+01	,99936+01	-,99372+00	,21462+03	,10473+01	,11278+00	,3488-02
10	,27832+03	,63482+02	,43843+01	,10977+02	-,95509+00	,21940+03	,11687+01	,11953+00	-,5712-02
11	,26107+03	,61846+02	,42213+01	,11637+02	-,81948+00	,22266+03	,12537+01	,12637+00	-,1149-01
12	,24377+03	,60082+02	,40572+01	,12279+02	-,68763+00	,22583+03	,13410+01	,13374+00	-,1649-01

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,52131+03	,74085+02	,70367+01	,00000	-,18306+01	,18689+03	,17974+00	,72779-01	,7219-01

3	,51580+03	,74566+02	,69153+01	,21190+01	-,17729+01	,19029+03	,27037+00	,73039-01	,5832-01
4	,49341+03	,73757+02	,66897+01	,34792+01	-,16392+01	,19179+03	,37848+00	,76389-01	,5593-01
5	,45081+03	,69536+02	,65982+01	,46665+01	-,14530+01	,18578+03	,49535+00	,79259-01	,9229-01
6	,42462+03	,69524+02	,61075+01	,57456+01	-,13484+01	,19747+03	,69726+00	,85473-01	,5078-01
7	,38438+03	,67431+02	,57003+01	,79120+01	-,11854+01	,20058+03	,82340+00	,91688-01	,4716-01
8	,34892+03	,64411+02	,54171+01	,88830+01	-,10560+01	,20104+03	,94203+00	,97973-01	,5627-01
9	,31149+03	,62144+02	,50125+01	,95944+01	-,96627+00	,20185+03	,10338+01	,10625+00	,6143-01
10	,27901+03	,60244+02	,46314+01	,10462+02	-,92272+00	,20576+03	,11436+01	,11261+00	,5431-01
11	,26171+03	,58838+02	,44479+01	,11071+02	-,79143+00	,20869+03	,12229+01	,11906+00	,4889-01
12	,24443+03	,57316+02	,42646+01	,11665+02	-,66319+00	,21155+03	,13044+01	,12599+00	,4413-01

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,52572+03	,70038+02	,75062+01	,00000	-,17833+01	,17668+03	,18009+00	,68628-01	,1229+00
3	,51970+03	,70878+02	,73323+01	,19490+01	-,17232+01	,18058+03	,26116+00	,68872-01	,1060+00
4	,49681+03	,69746+02	,71232+01	,34592+01	-,16056+01	,18164+03	,38594+00	,72031-01	,1063+00
5	,46175+03	,67234+02	,68679+01	,46041+01	-,14164+01	,17969+03	,49650+00	,74738-01	,1221+00
6	,42700+03	,66589+02	,64124+01	,54800+01	-,13078+01	,18832+03	,68466+00	,80597-01	,9374-01
7	,38651+03	,64535+02	,59891+01	,75897+01	-,11548+01	,19081+03	,80767+00	,86458-01	,9220-01
8	,35023+03	,62170+02	,56335+01	,87214+01	-,10227+01	,19398+03	,94123+00	,92384-01	,8934-01
9	,31248+03	,60290+02	,51829+01	,94876+01	-,92841+00	,19616+03	,10376+01	,10019+00	,8826-01
10	,27983+03	,58407+02	,47911+01	,10256+02	-,88462+00	,19900+03	,11384+01	,10618+00	,8487-01
11	,26246+03	,57094+02	,45970+01	,10821+02	-,75524+00	,20156+03	,12133+01	,11226+00	,8042-01
12	,24518+03	,55679+02	,44035+01	,11374+02	-,62867+00	,20408+03	,12902+01	,11880+00	,7652-01

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,52979+03	,68546+02	,77289+01	,00000	-,17460+01	,17289+03	,17823+00	,64756-01	,1416+00
3	,52336+03	,69028+02	,75818+01	,18503+01	-,16791+01	,17569+03	,25417+00	,64987-01	,1300+00
4	,50018+03	,68021+02	,73533+01	,34853+01	-,15671+01	,17735+03	,39159+00	,67968-01	,1276+00
5	,46487+03	,66559+02	,69844+01	,47364+01	-,13726+01	,17856+03	,51085+00	,70522-01	,1286+00
6	,42988+03	,65266+02	,65866+01	,53680+01	-,12621+01	,18424+03	,67914+00	,76050-01	,1130+00
7	,38916+03	,63394+02	,61388+01	,75230+01	-,11086+01	,18740+03	,80717+00	,81580-01	,1084+00
8	,35180+03	,61418+02	,57280+01	,87643+01	-,97581+00	,19243+03	,95100+00	,87172-01	,9752-01
9	,31358+03	,59755+02	,52477+01	,95941+01	-,88173+00	,19580+03	,10534+01	,94537-01	,9145-01
10	,28077+03	,57826+02	,48554+01	,10319+02	-,83860+00	,19816+03	,11507+01	,10019+00	,8992-01
11	,26331+03	,56556+02	,46558+01	,10869+02	-,70831+00	,20070+03	,12240+01	,10593+00	,8539-01
12	,24599+03	,55189+02	,44572+01	,11406+02	-,58074+00	,20320+03	,12993+01	,11210+00	,8139-01

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,53372+03	,68737+02	,77648+01	,00000	-,17041+01	,17329+03	,17372+00	,61129-01	,1395+00
3	,52709+03	,68594+02	,76843+01	,18184+01	-,16298+01	,17447+03	,24919+00	,61346-01	,1359+00
4	,50380+03	,67788+02	,74320+01	,35491+01	-,15145+01	,17691+03	,39610+00	,64160-01	,1300+00
5	,46836+03	,66513+02	,70416+01	,48994+01	-,13174+01	,17915+03	,52576+00	,66571-01	,1266+00
6	,43324+03	,65047+02	,66605+01	,53651+01	-,12045+01	,18360+03	,67884+00	,71790-01	,1160+00
7	,39208+03	,63206+02	,62032+01	,76186+01	-,10488+01	,18759+03	,81754+00	,77010-01	,1084+00
8	,35347+03	,61258+02	,57701+01	,88853+01	-,92312+00	,19305+03	,96462+00	,82289-01	,9589-01
9	,31479+03	,59608+02	,52810+01	,97444+01	-,83289+00	,19684+03	,10706+01	,89242-01	,8826-01
10	,28183+03	,57630+02	,48904+01	,10479+02	-,78898+00	,19929+03	,11699+01	,94581-01	,8661-01
11	,26425+03	,56368+02	,46880+01	,11035+02	-,65697+00	,20202+03	,12444+01	,99997-01	,8137-01
12	,24681+03	,55005+02	,44870+01	,11580+02	-,52768+00	,20470+03	,13210+01	,10582+00	,7670-01

AT LINE 17

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,53803+03	,69401+02	,77458+01	,00000	-,16480+01	,17501+03	,16712+00	,57716-01	,1309+00
3	,53146+03	,68746+02	,77308+01	,18197+01	-,15676+01	,17475+03	,24482+00	,57922-01	,1343+00
4	,50805+03	,68056+02	,74653+01	,36153+01	-,14445+01	,17772+03	,39885+00	,60579-01	,1262+00

5	,47232+03	,66524+02	,70999+01	,49983+01	-,12511+01	,17959+03	,53391+00	,62855-01	,1250+00
6	,43686+03	,65158+02	,67049+01	,54063+01	-,11354+01	,18406+03	,68120+00	,67783-01	,1140+00
7	,39498+03	,63165+02	,62532+01	,77403+01	-,98179+00	,18835+03	,82970+00	,72712-01	,1058+00
8	,35515+03	,61109+02	,58117+01	,89707+01	-,87025+00	,19339+03	,97442+00	,77696-01	,9522-01
9	,31614+03	,59394+02	,53228+01	,98247+01	-,78537+00	,19706+03	,10808+01	,84260-01	,8827-01
10	,28302+03	,57353+02	,49346+01	,10595+02	-,74008+00	,19978+03	,11852+01	,89302-01	,8583-01
11	,26525+03	,56059+02	,47316+01	,11167+02	-,60768+00	,20268+03	,12624+01	,94415-01	,8011-01
12	,24760+03	,54658+02	,45306+01	,11727+02	-,47813+00	,20552+03	,13417+01	,99915-01	,7500-01

AT LINE 18

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,54319+03	,70070+02	,77521+01	,00000	-,15746+01	,17642+03	,15897+00	,54496-01	,1237+00
3	,53691+03	,68975+02	,77841+01	,18265+01	-,14901+01	,17522+03	,23988+00	,54690-01	,1318+00
4	,51317+03	,68290+02	,75146+01	,36549+01	-,13593+01	,17833+03	,39881+00	,57198-01	,1232+00
5	,47672+03	,66452+02	,71738+01	,50205+01	-,11769+01	,17943+03	,53462+00	,59348-01	,1259+00
6	,44062+03	,65192+02	,67588+01	,64410+01	-,10589+01	,18428+03	,68325+00	,64000-01	,1131+00
7	,39774+03	,62974+02	,63160+01	,78060+01	-,91165+00	,18832+03	,83701+00	,68654-01	,1066+00
8	,35683+03	,60840+02	,58650+01	,89770+01	-,81796+00	,19273+03	,97671+00	,73360-01	,9851-01
9	,31759+03	,59077+02	,53758+01	,98064+01	-,73930+00	,19605+03	,10813+01	,79558-01	,9298-01
10	,28425+03	,56958+02	,49906+01	,10615+02	-,69387+00	,19898+03	,11913+01	,84318-01	,9008-01
11	,26625+03	,55607+02	,47880+01	,11203+02	-,56322+00	,20193+03	,12713+01	,89146-01	,8440-01
12	,24836+03	,54147+02	,45867+01	,11777+02	-,43556+00	,20481+03	,13536+01	,94339-01	,7935-01

AT LINE 19

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,54947+03	,70427+02	,78020+01	,00000	-,14861+01	,17717+03	,14966+00	,51445-01	,1197+00
3	,54357+03	,69133+02	,78627+01	,18258+01	-,13995+01	,17548+03	,23384+00	,51629-01	,1304+00
4	,51909+03	,68381+02	,75911+01	,36579+01	-,12648+01	,17844+03	,39558+00	,53997-01	,1225+00
5	,48147+03	,66344+02	,72572+01	,49874+01	-,10994+01	,17890+03	,52992+00	,56026-01	,1281+00
6	,44442+03	,65086+02	,68282+01	,64436+01	-,97954+00	,18395+03	,68278+00	,60418-01	,1146+00
7	,40041+03	,62683+02	,63879+01	,77944+01	-,83971+00	,18744+03	,83685+00	,64811-01	,1108+00
8	,35851+03	,60541+02	,59217+01	,89076+01	-,76581+00	,19132+03	,97111+00	,69254-01	,1046+00
9	,31902+03	,58752+02	,54299+01	,97066+01	-,69444+00	,19423+03	,10730+01	,75105-01	,1006+00
10	,28544+03	,56545+02	,50479+01	,10548+02	-,65055+00	,19720+03	,11877+01	,79599-01	,9788-01
11	,26720+03	,55137+02	,48461+01	,11145+02	-,52329+00	,20009+03	,12700+01	,84156-01	,9261-01
12	,24907+03	,53620+02	,46451+01	,11729+02	-,39913+00	,20291+03	,13545+01	,89059-01	,8799-01

AT LINE 20

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,55675+03	,70613+02	,78846+01	,00000	-,13879+01	,17750+03	,13959+00	,48549-01	,1179+00
3	,55120+03	,69238+02	,79610+01	,18144+01	-,13011+01	,17559+03	,22678+00	,48722-01	,1296+00
4	,52554+03	,68391+02	,76843+01	,36284+01	-,11674+01	,17824+03	,38953+00	,50957-01	,1232+00
5	,48649+03	,66260+02	,73422+01	,49214+01	-,10218+01	,17828+03	,52187+00	,52872-01	,1306+00
6	,44833+03	,64919+02	,69060+01	,64067+01	-,90059+00	,18323+03	,67863+00	,57017-01	,1178+00
7	,40307+03	,62410+02	,64584+01	,77167+01	-,76748+00	,18609+03	,82961+00	,61162-01	,1165+00
8	,36013+03	,60308+02	,59715+01	,87796+01	-,71366+00	,18957+03	,95863+00	,65355-01	,1116+00
9	,32030+03	,58490+02	,54761+01	,95498+01	-,65135+00	,19204+03	,10578+01	,70877-01	,1093+00
10	,28647+03	,56192+02	,50981+01	,10416+02	-,60934+00	,19491+03	,11764+01	,75117-01	,1073+00
11	,26804+03	,54743+02	,48964+01	,11019+02	-,48625+00	,19769+03	,12599+01	,79418-01	,1026+00
12	,24973+03	,53186+02	,46954+01	,11607+02	-,36629+00	,20039+03	,13458+01	,84045-01	,9847-01

AT LINE 21

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,56470+03	,70729+02	,79840+01	,00000	-,12856+01	,17765+03	,12919+00	,45792-01	,1170+00
3	,55934+03	,69334+02	,80674+01	,17932+01	-,12004+01	,17566+03	,21902+00	,45955-01	,1290+00
4	,53218+03	,68391+02	,77815+01	,35742+01	-,10714+01	,17794+03	,38133+00	,48062-01	,1242+00
5	,49169+03	,66228+02	,74242+01	,48359+01	-,94527+00	,17771+03	,51172+00	,49869-01	,1328+00
6	,45234+03	,64772+02	,69836+01	,63320+01	-,82447+00	,18232+03	,67055+00	,53778-01	,1215+00

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7	,40373+03	,62223+02	,65205+01	,75915+01	-,69833+00	,18462+03	,81678+00	,57688-01	,1224+00
8	,36163+03	,60184+02	,60088+01	,86092+01	-,66472+00	,18774+03	,94070+00	,61643-01	,1186+00
9	,32136+03	,58317+02	,55106+01	,93547+01	-,61078+00	,18973+03	,10375+01	,66851-01	,1181+00
10	,28733+03	,55931+02	,51372+01	,10244+02	-,56924+00	,19246+03	,11594+01	,70851-01	,1169+00
11	,26876+03	,54467+02	,49343+01	,10847+02	-,45062+00	,19510+03	,12432+01	,74908-01	,1127+00
12	,25032+03	,52896+02	,47322+01	,11435+02	-,33505+00	,19767+03	,13293+01	,79271-01	,1092+00

AT LINE 22

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,57287+03	,70831+02	,80879+01	,00000	-,11832+01	,17778+03	,11882+00	,43160-01	,1161+00
3	,56749+03	,69440+02	,81723+01	,17639+01	-,11013+01	,17576+03	,21090+00	,43314-01	,1283+00
4	,53870+03	,68412+02	,78743+01	,35025+01	-,97888+00	,17764+03	,37161+00	,45301-01	,1252+00
5	,49686+03	,66245+02	,75003+01	,47370+01	-,87098+00	,17721+03	,50013+00	,47003-01	,1345+00
6	,45630+03	,64682+02	,70546+01	,62250+01	-,75393+00	,18136+03	,65894+00	,50688-01	,1253+00
7	,40829+03	,62135+02	,65710+01	,74333+01	-,63639+00	,18317+03	,79989+00	,54374-01	,1279+00
8	,36299+03	,60165+02	,60332+01	,84083+01	-,62071+00	,18595+03	,91866+00	,58101-01	,1250+00
9	,32226+03	,58230+02	,55342+01	,91339+01	-,57288+00	,18745+03	,10136+01	,63010-01	,1265+00
10	,28803+03	,55771+02	,51645+01	,10045+02	-,52984+00	,19002+03	,11384+01	,66780-01	,1262+00
11	,26933+03	,54321+02	,49582+01	,10643+02	-,41583+00	,19252+03	,12214+01	,70603-01	,1224+00
12	,25080+03	,52765+02	,47531+01	,11226+02	-,30469+00	,19497+03	,13066+01	,74716-01	,1193+00

AT LINE 23

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,58070+03	,70932+02	,81879+01	,00000	-,10844+01	,17792+03	,10882+00	,40644-01	,1153+00
3	,57520+03	,69554+02	,82698+01	,17279+01	-,10070+01	,17588+03	,20267+00	,40789-01	,1274+00
4	,54475+03	,68454+02	,79579+01	,34186+01	-,89167+00	,17738+03	,36089+00	,42660-01	,1260+00
5	,50168+03	,66292+02	,75677+01	,46277+01	-,80092+00	,17676+03	,48750+00	,44263-01	,1359+00
6	,45993+03	,64647+02	,71145+01	,60922+01	-,69147+00	,18041+03	,64448+00	,47733-01	,1288+00
7	,41065+03	,62134+02	,66092+01	,72522+01	-,58374+00	,18180+03	,78009+00	,51204-01	,1328+00
8	,36423+03	,60233+02	,60470+01	,81854+01	-,58182+00	,18425+03	,89362+00	,54714-01	,1308+00
9	,32307+03	,58218+02	,55492+01	,88959+01	-,53751+00	,18526+03	,98716+00	,59336-01	,1344+00
10	,28861+03	,55710+02	,51805+01	,98282+01	-,49157+00	,18769+03	,11143+01	,62887-01	,1347+00
11	,26979+03	,54304+02	,49681+01	,10415+02	-,38218+00	,19007+03	,11953+01	,66487-01	,1312+00
12	,25117+03	,52793+02	,47578+01	,10988+02	-,27533+00	,19238+03	,12785+01	,70360-01	,1283+00

AT LINE 24

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,58799+03	,71024+02	,82787+01	,00000	-,99282+00	,17805+03	,99565-01	,38233-01	,1145+00
3	,58211+03	,69662+02	,83562+01	,16869+01	-,92038+00	,17600+03	,19458+00	,38370-01	,1266+00
4	,55006+03	,68503+02	,80296+01	,33261+01	-,81201+00	,17712+03	,34961+00	,40130-01	,1268+00
5	,50585+03	,66350+02	,76239+01	,45095+01	-,73742+00	,17631+03	,47410+00	,41638-01	,1373+00
6	,46306+03	,64656+02	,71618+01	,59393+01	-,63745+00	,17948+03	,62787+00	,44902-01	,1320+00
7	,41281+03	,62203+02	,66366+01	,70545+01	-,53914+00	,18054+03	,75816+00	,48167-01	,1370+00
8	,36542+03	,60369+02	,60532+01	,79464+01	-,54682+00	,18264+03	,86642+00	,51469-01	,1360+00
9	,32385+03	,58269+02	,55578+01	,86470+01	-,50476+00	,18319+03	,95901+00	,55817-01	,1416+00
10	,28911+03	,55747+02	,51861+01	,95977+01	-,45540+00	,18553+03	,10876+01	,59157-01	,1422+00
11	,27015+03	,54410+02	,49650+01	,10167+02	-,35030+00	,18777+03	,11655+01	,62544-01	,1390+00
12	,25145+03	,52971+02	,47468+01	,10724+02	-,24733+00	,18996+03	,12456+01	,66187-01	,1363+00

AT LINE 25

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,59416+03	,71097+02	,83570+01	,00000	-,91149+00	,17816+03	,91361-01	,35920-01	,1138+00
3	,58801+03	,69755+02	,84297+01	,16417+01	-,84394+00	,17609+03	,18679+00	,36048-01	,1260+00
4	,55449+03	,68550+02	,80888+01	,32274+01	-,74150+00	,17686+03	,33803+00	,37701-01	,1275+00
5	,50929+03	,66409+02	,76690+01	,43836+01	-,68102+00	,17586+03	,46008+00	,39118-01	,1387+00
6	,46571+03	,64701+02	,71979+01	,57719+01	-,58966+00	,17858+03	,60961+00	,42185-01	,1351+00
7	,41482+03	,62329+02	,66554+01	,68444+01	-,49941+00	,17937+03	,73465+00	,45252-01	,1407+00
8	,36658+03	,60556+02	,60536+01	,76958+01	-,51441+00	,18113+03	,83768+00	,48354-01	,1407+00

9	,32459+03	,58372+02	,55607+01	,53912+01	-,47482+00	,18125+03	,92971+00	,52439-01	,1481+00
10	,28955+03	,55876+02	,51820+01	,93555+01	-,42200+00	,18354+03	,10588+01	,55577-01	,1488+00
11	,27046+03	,54633+02	,49504+01	,99003+01	-,32070+00	,18565+03	,11327+01	,58759-01	,1458+00
12	,25169+03	,53290+02	,47229+01	,10437+02	-,22104+00	,16772+03	,12086+01	,62182-01	,1432+00

AT LINE 26

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,59926+03	,71147+02	,84229+01	,00000	-,84093+00	,17822+03	,84259-01	,33696-01	,1134+00
3	,59296+03	,69829+02	,84915+01	,15932+01	-,77778+00	,17614+03	,17931+00	,33816-01	,1255+00
4	,55820+03	,68593+02	,81378+01	,31242+01	-,67937+00	,17659+03	,32626+00	,35367-01	,1283+00
5	,51222+03	,66473+02	,77057+01	,42512+01	-,63000+00	,17542+03	,44549+00	,36696-01	,1400+00
6	,46805+03	,64779+02	,72254+01	,55932+01	-,54517+00	,17774+03	,59010+00	,39573-01	,1378+00
7	,41671+03	,62499+02	,66674+01	,66249+01	-,46209+00	,17830+03	,70996+00	,42450-01	,1439+00
8	,36768+03	,60781+02	,60492+01	,74367+01	-,48403+00	,17972+03	,80788+00	,45360-01	,1450+00
9	,32526+03	,58521+02	,55580+01	,81312+01	-,44745+00	,17946+03	,89968+00	,49192-01	,1539+00
10	,28997+03	,56095+02	,51692+01	,91026+01	-,39137+00	,18174+03	,10281+01	,52136-01	,1544+00
11	,27074+03	,54963+02	,49259+01	,96187+01	-,29355+00	,18371+03	,10970+01	,55121-01	,1515+00
12	,25192+03	,53736+02	,46881+01	,10129+02	-,19686+00	,18565+03	,11680+01	,58332-01	,1489+00

AT LINE 27

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,60362+03	,71183+02	,84799+01	,00000	-,77851+00	,17826+03	,77986-01	,31554-01	,1132+00
3	,59726+03	,69893+02	,85455+01	,15422+01	-,71929+00	,17618+03	,17203+00	,31667-01	,1252+00
4	,56151+03	,68640+02	,81805+01	,30176+01	-,62313+00	,17635+03	,31432+00	,33119-01	,1290+00
5	,51489+03	,66548+02	,77372+01	,41130+01	-,58230+00	,17500+03	,43037+00	,34364-01	,1413+00
6	,47018+03	,64886+02	,72463+01	,54059+01	-,50272+00	,17695+03	,56964+00	,37058-01	,1402+00
7	,41842+03	,62702+02	,66732+01	,63982+01	-,42667+00	,17731+03	,68441+00	,39752-01	,1467+00
8	,36867+03	,61034+02	,60403+01	,71715+01	-,45558+00	,17840+03	,77738+00	,42477-01	,1487+00
9	,32585+03	,58712+02	,55500+01	,78683+01	-,42173+00	,17782+03	,86912+00	,46066-01	,1591+00
10	,29035+03	,56395+02	,51485+01	,88396+01	-,36303+00	,18012+03	,99569+00	,48822-01	,1591+00
11	,27101+03	,55388+02	,48929+01	,93215+01	-,26885+00	,18195+03	,10590+01	,51618-01	,1562+00
12	,25215+03	,54292+02	,46443+01	,98004+01	-,17528+00	,18377+03	,11243+01	,54625-01	,1536+00

AT LINE 28

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,60764+03	,71216+02	,85323+01	,00000	-,72091+00	,17830+03	,72198-01	,29490-01	,1129+00
3	,60132+03	,69957+02	,85955+01	,14890+01	-,66545+00	,17622+03	,16480+00	,29595-01	,1248+00
4	,56468+03	,68696+02	,82200+01	,29083+01	-,57108+00	,17613+03	,30222800	,30952-01	,1296+00
5	,51745+03	,66636+02	,77653+01	,39701+01	-,53764+00	,17462+03	,41479+00	,32116-01	,1423+00
6	,47211+03	,65015+02	,72615+01	,52124+01	-,46303+00	,17623+03	,54850+00	,34633-01	,1423+00
7	,41992+03	,62928+02	,66731+01	,61659+01	-,39378+00	,17641+03	,65825+00	,37152-01	,1491+00
8	,36955+03	,61310+02	,60275+01	,69022+01	-,42879+00	,17719+03	,74644+00	,39698-01	,1521+00
9	,32635+03	,58943+02	,55367+01	,76033+01	-,39667+00	,17634+03	,83813+00	,43052-01	,1635+00
10	,29070+03	,56771+02	,51206+01	,85667+01	-,33648+00	,17868+03	,96166+00	,45628-01	,1629+00
11	,27126+03	,55898+02	,48528+01	,90104+01	-,24647+00	,18037+03	,10189+01	,48241-01	,1600+00
12	,25239+03	,54945+02	,45935+01	,94535+01	-,15655+00	,18206+03	,10780+01	,51051-01	,1574+00

AT LINE 29

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,61153+03	,71253+02	,85825+01	,00000	-,66699+00	,17835+03	,68781-01	,27497-01	,1126+00
3	,60521+03	,70023+02	,86431+01	,14341+01	-,61540+00	,17627+03	,15762+00	,27595-01	,1244+00
4	,56774+03	,68759+02	,82569+01	,27963+01	-,52364+00	,17595+03	,29001+00	,28881-01	,1300+00
5	,51987+03	,66734+02	,77901+01	,38230+01	-,49729+00	,17427+03	,39885+00	,29945-01	,1432+00
6	,47382+03	,65162+02	,72714+01	,50140+01	-,42727+00	,17557+03	,52685+00	,32293-01	,1442+00
7	,42124+03	,63173+02	,66680+01	,59292+01	-,36379+00	,17558+03	,63166+00	,34641-01	,1512+00
8	,37035+03	,61606+02	,60115+01	,66297+01	-,40325+00	,17607+03	,71519+00	,37016-01	,1550+00
9	,32676+03	,59212+02	,55185+01	,73363+01	-,37178+00	,17501+03	,80679+00	,40143-01	,1673+00
10	,29099+03	,57215+02	,50860+01	,82839+01	-,31138+00	,17740+03	,92624+00	,42545-01	,1659+00

11	,27150+03	,56485+02	,48066+01	,84861+01	-,22613+00	,17896+03	,97709+00	,44981-01	,1629+00
12	,25264+03	,55604+02	,45371+01	,90893+01	-,14050+00	,18053+03	,10296+01	,47601-01	,1602+00

AT LINE 30

	P	T	RHO	U	V	E	M	Z	CHSTAG
2	,61522+03	,71269+02	,86299+01	,00000	-,61790+00	,17841+03	,61650-01	,25571-01	,1123+00
3	,60887+03	,70086+02	,86875+01	,13780+01	-,57015+00	,17833+03	,15055+00	,25662-01	,1239+00
4	,57061+03	,68826+02	,82906+01	,26837+01	-,48198+00	,17578+03	,27777+00	,26839-01	,1304+00
5	,52210+03	,66840+02	,78113+01	,36727+01	-,46207+00	,17395+03	,38266+00	,27848-01	,1439+00
6	,47537+03	,65325+02	,72770+01	,48120+01	-,39552+00	,17497+03	,50487+00	,30031-01	,1457+00
7	,42244+03	,63437+02	,66593+01	,56891+01	-,33657+00	,17483+03	,60474+00	,32214-01	,1529+00
8	,37109+03	,61922+02	,59929+01	,63554+01	-,37879+00	,17507+03	,68380+00	,34423-01	,1574+00
9	,32708+03	,59518+02	,54956+01	,70671+01	-,34726+00	,17383+03	,77513+00	,37331-01	,1704+00
10	,29123+03	,57722+02	,50453+01	,79913+01	-,28753+00	,17628+03	,88956+00	,39565-01	,1681+00
11	,27170+03	,57139+02	,47552+01	,83496+01	-,20746+00	,17773+03	,93384+00	,41830-01	,1650+00
12	,25290+03	,56495+02	,44764+01	,87112+01	-,12662+00	,17919+03	,97961+00	,44267-01	,1621+00

AT LINE 31

	P	T	RHO	U	V	E	M	Z	CHSTAG
2	,61859+03	,71320+02	,86734+01	,00000	-,57447+00	,17847+03	,57491-01	,23707-01	,1120+00
3	,61221+03	,70144+02	,87279+01	,13205+01	-,53015+00	,17637+03	,14360+00	,23792-01	,1236+00
4	,57327+03	,68894+02	,83210+01	,25693+01	-,44586+00	,17564+03	,26552+00	,24883-01	,1306+00
5	,52418+03	,66951+02	,78293+01	,35193+01	-,43120+00	,17366+03	,36623+00	,25818-01	,1446+00
6	,47685+03	,65505+02	,72796+01	,46069+01	-,36703+00	,17444+03	,48259+00	,27842-01	,1469+00
7	,42361+03	,63719+02	,66481+01	,54461+01	-,31203+00	,17418+03	,57756+00	,29866-01	,1542+00
8	,37180+03	,62256+02	,59722+01	,60793+01	-,35575+00	,17418+03	,65235+00	,31914-01	,1594+00
9	,32734+03	,59861+02	,54684+01	,67948+01	-,32361+00	,17279+03	,74308+00	,34610-01	,1729+00
10	,29141+03	,58288+02	,49994+01	,76900+01	-,26482+00	,17532+03	,85179+00	,36681-01	,1695+00
11	,27189+03	,57853+02	,46997+01	,80026+01	-,19020+00	,17667+03	,88946+00	,38781-01	,1662+00
12	,25314+03	,57369+02	,44126+01	,83197+01	-,11448+00	,17804+03	,92843+00	,41040-01	,1631+00

AT LINE 32

	P	T	RHO	U	V	E	M	Z	CHSTAG
2	,62162+03	,71346+02	,87127+01	,00000	-,53548+00	,17851+03	,53578-01	,21902-01	,1117+00
3	,61524+03	,70198+02	,87644+01	,12625+01	-,49403+00	,17641+03	,13675+00	,21980-01	,1232+00
4	,57576+03	,68965+02	,83485+01	,24539+01	-,41348+00	,17551+03	,25325+00	,22988-01	,1308+00
5	,52614+03	,67070+02	,78446+01	,33639+01	-,40302+00	,17342+03	,34963+00	,23852-01	,1450+00
6	,47828+03	,65699+02	,72799+01	,43999+01	-,34115+00	,17398+03	,46015+00	,25722-01	,1479+00
7	,42476+03	,64017+02	,66351+01	,52012+01	-,29036+00	,17361+03	,55026+00	,27592-01	,1552+00
8	,37248+03	,62607+02	,59496+01	,58037+01	-,33452+00	,17341+03	,62094+00	,29484-01	,1609+00
9	,32757+03	,60241+02	,54376+01	,65195+01	-,30126+00	,17190+03	,71067+00	,31975-01	,1747+00
10	,29156+03	,58909+02	,49493+01	,73801+01	-,24338+00	,17453+03	,81310+00	,33888-01	,1701+00
11	,27205+03	,58621+02	,46409+01	,76461+01	-,17430+00	,17580+03	,84423+00	,35828-01	,1666+00
12	,25338+03	,58295+02	,43464+01	,79173+01	-,10386+00	,17709+03	,87646+00	,37915-01	,1632+00

AT LINE 33

	P	T	RHO	U	V	E	M	Z	CHSTAG
2	,62437+03	,71367+02	,87487+01	,00000	-,49862+00	,17854+03	,49883-01	,20152-01	,1115+00
3	,61801+03	,70246+02	,87979+01	,12036+01	-,45977+00	,17644+03	,12992+00	,20224-01	,1230+00
4	,57809+03	,69036+02	,83737+01	,23375+01	-,38313+00	,17540+03	,24094+00	,21151-01	,1310+00
5	,52796+03	,67194+02	,78573+01	,32063+01	-,37641+00	,17320+03	,33285+00	,21946-01	,1454+00
6	,47964+03	,65905+02	,72778+01	,41909+01	-,31766+00	,17359+03	,43755+00	,23667-01	,1485+00
7	,42588+03	,64331+02	,66202+01	,49542+01	-,27160+00	,17314+03	,52282+00	,25387-01	,1558+00
8	,37314+03	,62975+02	,59252+01	,55267+01	-,31512+00	,17276+03	,58955+00	,27128-01	,1619+00
9	,32779+03	,60660+02	,54038+01	,62401+01	-,28053+00	,17116+03	,67783+00	,29420-01	,1758+00
10	,29169+03	,59581+02	,48957+01	,70622+01	-,22351+00	,17392+03	,77364+00	,31180-01	,1699+00
11	,27221+03	,59435+02	,45799+01	,72813+01	-,15989+00	,17511+03	,79841+00	,32965-01	,1662+00
12	,25359+03	,59263+02	,42790+01	,75056+01	-,94715-01	,17633+03	,82407+00	,34886-01	,1624+00

AT LINE 34

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.62685+03	.71387+02	.87811+01	.00000	-.46266+00	.17857+03	.46280-01	.18453-01	.1113+00
3	.62052+03	.70293+02	.88276+01	.11444+01	-.42646+00	.17848+03	.12311+00	.18519-01	.1227+00
4	.58019+03	.69109+02	.83953+01	.22210+01	-.35427+00	.17530+03	.22866+00	.19368-01	.1311+00
5	.52958+03	.67322+02	.78665+01	.30479+01	-.35103+00	.17301+03	.31602+00	.20096-01	.1456+00
6	.48088+03	.66120+02	.72728+01	.39814+01	-.29624+00	.17327+03	.41495+00	.21672-01	.1489+00
7	.42695+03	.64657+02	.66034+01	.47064+01	-.25512+00	.17275+03	.49540+00	.23248-01	.1560+00
8	.37378+03	.63360+02	.58993+01	.52500+01	-.29719+00	.17223+03	.55832+00	.24841-01	.1624+00
9	.32802+03	.61117+02	.53672+01	.59578+01	-.26156+00	.17057+03	.64471+00	.26940-01	.1763+00
10	.29184+03	.60305+02	.48394+01	.67373+01	-.20557+00	.17348+03	.73358+00	.28552-01	.1689+00
11	.27236+03	.60296+02	.45170+01	.69091+01	-.14713+00	.17462+03	.75216+00	.30187-01	.1648+00
12	.25379+03	.60272+02	.42107+01	.70851+01	-.87006-01	.17579+03	.77143+00	.31945-01	.1608+00

AT LINE 35

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.62899+03	.71390+02	.88106+01	.00000	-.42773+00	.17857+03	.42785-01	.16803-01	.1114+00
3	.62266+03	.70322+02	.88544+01	.10843+01	-.39429+00	.17847+03	.11628+00	.16863-01	.1226+00
4	.58200+03	.69170+02	.84141+01	.21032+01	-.32694+00	.17519+03	.21629+00	.17637-01	.1313+00
5	.53095+03	.67442+02	.78726+01	.28871+01	-.32669+00	.17283+03	.29902+00	.18300-01	.1458+00
6	.48196+03	.66337+02	.72654+01	.37694+01	-.27626+00	.17299+03	.39219+00	.19734-01	.1492+00
7	.42796+03	.64989+02	.65850+01	.44564+01	-.24001+00	.17243+03	.46788+00	.21169-01	.1559+00
8	.37438+03	.63756+02	.58721+01	.49721+01	-.28030+00	.17179+03	.52712+00	.22620-01	.1626+00
9	.32826+03	.61606+02	.53284+01	.56706+01	-.24435+00	.17012+03	.61116+00	.24531-01	.1762+00
10	.29199+03	.61064+02	.47816+01	.64051+01	-.18968+00	.17319+03	.69304+00	.25999-01	.1672+00
11	.27251+03	.61182+02	.44542+01	.68301+01	-.13609+00	.17428+03	.70573+00	.27488-01	.1629+00
12	.25398+03	.61296+02	.41435+01	.66593+01	-.80722-01	.17542+03	.71892+00	.29089-01	.1584+00

AT LINE 36

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.63071+03	.71404+02	.88330+01	.00000	-.39402+00	.17859+03	.39409-01	.15200-01	.1112+00
3	.62442+03	.70363+02	.88742+01	.10249+01	-.36334+00	.17850+03	.10956+00	.15254-01	.1224+00
4	.58349+03	.69243+02	.84268+01	.19866+01	-.30086+00	.17513+03	.20407+00	.15954-01	.1312+00
5	.53206+03	.67574+02	.78737+01	.27275+01	-.30286+00	.17270+03	.28214+00	.16553-01	.1458+00
6	.48290+03	.66570+02	.72540+01	.35592+01	-.25694+00	.17279+03	.36964+00	.17851-01	.1490+00
7	.42886+03	.65340+02	.65636+01	.42082+01	-.22549+00	.17223+03	.44062+00	.19149-01	.1554+00
8	.37493+03	.64176+02	.58423+01	.46960+01	-.26400+00	.17150+03	.49621+00	.20461-01	.1621+00
9	.32848+03	.62139+02	.52862+01	.53824+01	-.22839+00	.16986+03	.57759+00	.22190-01	.1752+00
10	.29214+03	.61889+02	.47205+01	.60679+01	-.17556+00	.17315+03	.65215+00	.23518-01	.1644+00
11	.27268+03	.62134+02	.43886+01	.61459+01	-.12654+00	.17423+03	.65910+00	.24864-01	.1597+00
12	.25418+03	.62385+02	.40743+01	.62269+01	-.75712-01	.17535+03	.66634+00	.26313-01	.1548+00

AT LINE 37

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.63204+03	.71352+02	.88581+01	.00000	-.36111+00	.17845+03	.36130-01	.13639-01	.1119+00
3	.62580+03	.70339+02	.88970+01	.96377+00	-.33319+00	.17637+03	.10276+00	.13688-01	.1229+00
4	.58469+03	.69258+02	.84421+01	.18673+01	-.27553+00	.17493+03	.19169+00	.14316-01	.1319+00
5	.53294+03	.67660+02	.78768+01	.25640+01	-.27924+00	.17248+03	.26501+00	.14854-01	.1463+00
6	.48367+03	.66764+02	.72444+01	.33447+01	-.23810+00	.17253+03	.34683+00	.16018-01	.1493+00
7	.42964+03	.65654+02	.65440+01	.39552+01	-.21140+00	.17198+03	.41314+00	.17183-01	.1552+00
8	.37541+03	.64563+02	.58146+01	.44158+01	-.24810+00	.17119+03	.46520+00	.18361-01	.1619+00
9	.32867+03	.62657+02	.52455+01	.50860+01	-.21338+00	.16960+03	.54352+00	.19912-01	.1743+00
10	.29230+03	.62671+02	.46640+01	.57220+01	-.16313+00	.17306+03	.61112+00	.21104-01	.1619+00
11	.27285+03	.63017+02	.43298+01	.57545+01	-.11866+00	.17411+03	.61279+00	.22312-01	.1570+00
12	.25437+03	.63374+02	.40138+01	.57883+01	-.72420-01	.17519+03	.61456+00	.23612-01	.1519+00

AT LINE 38

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63304+03	,71398+02	,88664+01	,00000	-,32043+00	,17855+03	,32650-01	,12120-01	,1114+00
3	,62686+03	,70413+02	,89027+01	,90522+00	-,30328+00	,17649+03	,96153-01	,12164-01	,1222+00
4	,58561+03	,69367+02	,84422+01	,17528+01	-,25054+00	,17498+03	,17967+00	,12721-01	,1313+00
5	,53360+03	,67825+02	,78674+01	,24061+01	-,25557+00	,17249+03	,24831+00	,13200-01	,1456+00
6	,48425+03	,67042+02	,72231+01	,31372+01	-,21933+00	,17255+03	,32461+00	,14234-01	,1482+00
7	,43027+03	,66057+02	,65136+01	,37099+01	-,19709+00	,17204+03	,38632+00	,15269-01	,1535+00
8	,37580+03	,65056+02	,57766+01	,41428+01	-,23169+00	,17125+03	,43478+00	,16316-01	,1599+00
9	,32881+03	,63307+02	,51938+01	,47955+01	-,19813+00	,16979+03	,50981+00	,17695-01	,1713+00
10	,29244+03	,63664+02	,45935+01	,53775+01	-,15123+00	,17363+03	,56983+00	,18753-01	,1564+00
11	,27302+03	,64143+02	,42564+01	,53634+01	-,11131+00	,17475+03	,56610+00	,19827-01	,1507+00
12	,25457+03	,64643+02	,39381+01	,53487+01	-,69643-01	,17591+03	,56229+00	,20982-01	,1448+00

AT LINE 39

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63368+03	,71108+02	,89116+01	,00000	-,29639+00	,17781+03	,29706-01	,10640-01	,1150+00
3	,62758+03	,70155+02	,89456+01	,84197+00	-,27407+00	,17578+03	,89346-01	,10678-01	,1257+00
4	,58623+03	,69159+02	,84765+01	,16297+01	-,22652+00	,17425+03	,16721+00	,11168-01	,1346+00
5	,53401+03	,67696+02	,78883+01	,22366+01	-,23261+00	,17177+03	,23098+00	,11588-01	,1487+00
6	,48464+03	,67028+02	,72304+01	,29157+01	-,20127+00	,17184+03	,30171+00	,12496-01	,1508+00
7	,43072+03	,66153+02	,65110+01	,34485+01	-,18319+00	,17135+03	,35884+00	,13405-01	,1556+00
8	,37609+03	,65222+02	,57664+01	,38532+01	-,21558+00	,17050+03	,40387+00	,14324-01	,1620+00
9	,32888+03	,63626+02	,51689+01	,44823+01	-,18390+00	,16913+03	,47532+00	,15534-01	,1725+00
10	,29254+03	,64160+02	,45595+01	,50110+01	-,14152+00	,17297+03	,52893+00	,16463-01	,1570+00
11	,27316+03	,64668+02	,42240+01	,49532+01	-,10644+00	,17394+03	,52069+00	,17406-01	,1517+00
12	,25474+03	,65196+02	,39072+01	,48928+01	-,69818-01	,17496+03	,51219+00	,18420-01	,1462+00

AT LINE 40

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63406+03	,71346+02	,88871+01	,00000	-,26440+00	,17840+03	,26455-01	,91976-02	,1121+00
3	,62803+03	,70425+02	,89177+01	,78681+00	-,24479+00	,17640+03	,82986-01	,92304-02	,1225+00
4	,58662+03	,69461+02	,84453+01	,15219+01	-,20236+00	,17483+03	,15568+00	,96538-02	,1315+00
5	,53423+03	,68035+02	,78523+01	,20866+01	-,20896+00	,17229+03	,21487+00	,10017-01	,1456+00
6	,48487+03	,67520+02	,71811+01	,27190+01	-,18185+00	,17251+03	,28029+00	,10802-01	,1466+00
7	,43106+03	,66807+02	,64522+01	,32161+01	-,16720+00	,17220+03	,33299+00	,11587-01	,1503+00
8	,37631+03	,66014+02	,57004+01	,35939+01	-,19680+00	,17151+03	,37440+00	,12382-01	,1555+00
9	,32889+03	,64643+02	,50878+01	,42031+01	-,16695+00	,17046+03	,44216+00	,13428-01	,1642+00
10	,29262+03	,65679+02	,44553+01	,46745+01	-,12907+00	,17513+03	,48767+00	,14231-01	,1439+00
11	,27329+03	,66384+02	,41168+01	,45701+01	-,98650-01	,17641+03	,47416+00	,15046-01	,1368+00
12	,25492+03	,67119+02	,37980+01	,44604+01	-,66728-01	,17775+03	,46019+00	,15922-01	,1294+00

AT LINE 41

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63402+03	,69921+02	,90676+01	,00000	-,23426+00	,17483+03	,23677-01	,77901-02	,1299+00
3	,62807+03	,69055+02	,90953+01	,71557+00	-,21734+00	,17292+03	,76059-01	,78179-02	,1397+00
4	,58666+03	,68154+02	,86079+01	,13835+01	-,18036+00	,17136+03	,14283+00	,81785-02	,1485+00
5	,53418+03	,66805+02	,79962+01	,18952+01	-,18734+00	,16883+03	,19692+00	,84837-02	,1623+00
6	,48488+03	,66379+02	,73047+01	,24702+01	-,16469+00	,16901+03	,25682+00	,91488-02	,1631+00
7	,43118+03	,65706+02	,65623+01	,29210+01	-,15362+00	,16854+03	,30497+00	,98141-02	,1672+00
8	,37637+03	,64914+02	,57979+01	,32652+01	-,18088+00	,16763+03	,34303+00	,10487-01	,1733+00
9	,32880+03	,63669+02	,51642+01	,38384+01	-,15405+00	,16655+03	,40688+00	,11373-01	,1815+00
10	,29260+03	,64542+02	,45535+01	,42490+01	-,12237+00	,17039+03	,44718+00	,12053-01	,1648+00
11	,27334+03	,65084+02	,41998+01	,41049+01	-,97204-01	,17114+03	,43016+00	,12743-01	,1602+00
12	,25501+03	,65640+02	,38850+01	,39545+01	-,70941-01	,17192+03	,41259+00	,13486-01	,1554+00

AT LINE 42

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63399+03	,71046+02	,89236+01	,00000	-,20175+00	,17764+03	,20229-01	,64163-02	,1159+00

3	,62811+03	,70208+02	,89465+01	,57051+00	-,18722+00	,17576+03	,70218-01	,64391-02	,1255+00
4	,58671+03	,69345+02	,84607+01	,12957+01	-,15502+00	,17421+03	,13244+00	,67345-02	,1341+00
5	,53415+03	,68014+02	,78535+01	,17723+01	-,16136+00	,17162+03	,18237+00	,69876-02	,1481+00
6	,48488+03	,67850+02	,71464+01	,23095+01	-,14188+00	,17230+03	,23741+00	,75354-02	,1462+00
7	,43130+03	,67466+02	,63929+01	,27326+01	-,13303+00	,17241+03	,28151+00	,80833-02	,1472+00
8	,37643+03	,66920+02	,56250+01	,30551+01	-,15633+00	,17198+03	,31605+00	,86374-02	,1507+00
9	,32869+03	,66000+02	,49801+01	,36127+01	-,13103+00	,17153+03	,37608+00	,93671-02	,1555+00
10	,29262+03	,67745+02	,43194+01	,39673+01	-,10376+00	,17724+03	,40752+00	,99276-02	,1290+00
11	,27345+03	,68647+02	,39835+01	,37738+01	-,83183-01	,17874+03	,38505+00	,10496-01	,1205+00
12	,25519+03	,69581+02	,36675+01	,35700+01	-,61506-01	,18033+03	,36176+00	,11107-01	,1115+00

AT LINE 43

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63316+03	,65405+02	,96805+01	,00000	-,17212+00	,16353+03	,17987-01	,50745-02	,1861+00
3	,62738+03	,64684+02	,96992+01	,37574+00	-,16032+00	,16189+03	,62803-01	,50926-02	,1945+00
4	,58610+03	,63862+02	,91776+01	,11111+01	-,13423+00	,16028+03	,11836+00	,53261-02	,2031+00
5	,53356+03	,62528+02	,85331+01	,15143+01	-,14073+00	,15748+03	,16284+00	,55263-02	,2178+00
6	,48443+03	,62293+02	,77767+01	,19735+01	-,12572+00	,15769+03	,21175+00	,59595-02	,2179+00
7	,43100+03	,61691+02	,69864+01	,23288+01	-,12002+00	,15695+03	,25092+00	,63928-02	,2227+00
8	,37615+03	,60906+02	,61759+01	,25987+01	-,14058+00	,15565+03	,28183+00	,68311-02	,2301+00
9	,32837+03	,59983+02	,54743+01	,30886+01	-,11941+00	,15473+03	,33729+00	,74082-02	,2366+00
10	,29240+03	,60788+02	,48101+01	,33613+01	-,98993-01	,15762+03	,36452+00	,78515-02	,2235+00
11	,27331+03	,61156+02	,44690+01	,31446+01	-,83641-01	,15784+03	,33997+00	,83010-02	,2214+00
12	,25509+03	,61518+02	,41465+01	,29199+01	-,67716-01	,15806+03	,31472+00	,87846-02	,2193+00

AT LINE 44

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63329+03	,69252+02	,91447+01	,00000	-,13907+00	,17314+03	,14123-01	,37633-02	,1382+00
3	,62754+03	,68491+02	,91623+01	,55595+00	-,12903+00	,17139+03	,58284-01	,37767-02	,1472+00
4	,58619+03	,67723+02	,86558+01	,10728+01	-,10611+00	,16989+03	,11071+00	,39499-02	,1552+00
5	,53361+03	,66487+02	,80259+01	,14623+01	-,11042+00	,16729+03	,15200+00	,40983-02	,1689+00
6	,48448+03	,66571+02	,72777+01	,19021+01	-,96689-01	,16824+03	,19728+00	,44196-02	,1652+00
7	,43118+03	,66417+02	,64920+01	,22474+01	-,91615-01	,16857+03	,23326+00	,47410-02	,1646+00
8	,37630+03	,65969+02	,57041+01	,25090+01	-,10678+00	,16808+03	,26132+00	,50660-02	,1679+00
9	,32831+03	,65257+02	,50311+01	,29926+01	-,85576-01	,16762+03	,31322+00	,54940-02	,1721+00
10	,29249+03	,67209+02	,43520+01	,32079+01	-,69052-01	,17317+03	,33078+00	,58227-02	,1454+00
11	,27352+03	,68072+02	,40181+01	,29295+01	-,57957-01	,17447+03	,30015+00	,61561-02	,1377+00
12	,25537+03	,68944+02	,37039+01	,26371+01	-,46301-01	,17584+03	,26846+00	,65147-02	,1297+00

AT LINE 45

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63086+03	,52236+02	,12077+02	,00000	-,94742-01	,13059+03	,11079-01	,24813-02	,3500+00
3	,62528+03	,51704+02	,12094+02	,40593+00	-,88348-01	,12935+03	,48828-01	,24901-02	,3563+00
4	,58434+03	,50806+02	,11501+02	,77797+00	-,73831-01	,12732+03	,92659-01	,26043-02	,3667+00
5	,53192+03	,49229+02	,10805+02	,10429+01	-,77985-01	,12362+03	,12597+00	,27022-02	,3855+00
6	,48312+03	,48851+02	,98897+01	,13496+01	-,69150-01	,12304+03	,16341+00	,29140-02	,3889+00
7	,43005+03	,48083+02	,89441+01	,15775+01	-,65953-01	,12145+03	,19244+00	,31259-02	,3973+00
8	,37529+03	,46943+02	,79944+01	,17361+01	-,76993-01	,11887+03	,21436+00	,33402-02	,4105+00
9	,32753+03	,46073+02	,71089+01	,20680+01	-,64012-01	,11732+03	,25762+00	,36224-02	,4191+00
10	,29181+03	,46273+02	,63062+01	,21751+01	-,53331-01	,11805+03	,27032+00	,38392-02	,4158+00
11	,27291+03	,46262+02	,58993+01	,19415+01	-,46670-01	,11754+03	,24132+00	,40590-02	,4177+00
12	,25483+03	,46227+02	,55126+01	,17026+01	-,39858-01	,11702+03	,21170+00	,42954-02	,4196+00

AT LINE 46

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63309+03	,55023+02	,11506+02	,00000	-,66067-01	,13756+03	,75274-02	,12273-02	,3153+00
3	,62732+03	,54391+02	,11534+02	,39119+00	-,59395-01	,13606+03	,45343-01	,12316-02	,3229+00
4	,58585+03	,53709+02	,10908+02	,75190+00	-,43748-01	,13456+03	,86858-01	,12881-02	,3307+00

5	,53339+03	,52613+02	,10138+02	,10140+01	=,47770-01	,13205+03	,11828+00	,13365-02	,3435+00
6	,48429+03	,52342+02	,92526+01	,12963+01	=,38222-01	,13170+03	,15155+00	,14413-02	,3457+00
7	,43123+03	,51786+02	,83272+01	,15882+01	=,36487-01	,13060+03	,17719+00	,15461-02	,3516+00
8	,37647+03	,51007+02	,73807+01	,16604+01	=,46659-01	,12890+03	,19659+00	,16521-02	,3604+00
9	,32815+03	,50329+02	,65201+01	,19746+01	=,29290-01	,12777+03	,23527+00	,17917-02	,3668+00
10	,29254+03	,51261+02	,57068+01	,20030+01	=,22836-01	,13016+03	,23646+00	,18989-02	,3550+00
11	,27372+03	,51713+02	,52930+01	,17154+01	=,19683-01	,13075+03	,20162+00	,20076-02	,3513+00
12	,25566+03	,52148+02	,49026+01	,14162+01	=,16402-01	,13137+03	,16575+00	,21245-02	,3475+00

AT LINE 47

	P	T	RHO	U	V	E	M	Z	CF	CH
2	,62568+03	,60000+01	,10428+03	,00000	,00000	,15000+02	,000000	,00000	,0000	,1431-01
3	,62049+03	,60000+01	,10341+03	,00000	,00000	,15000+02	,000000	,00000	,5099-03	,1408-01
4	,58055+03	,60000+01	,96758+02	,00000	,00000	,15000+02	,000000	,00000	,9370-03	,1327-01
5	,52837+03	,60000+01	,88062+02	,00000	,00000	,15000+02	,000000	,00000	,1218-02	,1250-01
6	,48032+03	,60000+01	,80053+02	,00000	,00000	,15000+02	,000000	,00000	,1444-02	,1152-01
7	,42778+03	,60000+01	,71296+02	,00000	,00000	,15000+02	,000000	,00000	,1566-02	,1061-01
8	,37309+03	,60000+01	,62181+02	,00000	,00000	,15000+02	,000000	,00000	,1614-02	,9761-02
9	,32584+03	,60000+01	,54306+02	,00000	,00000	,15000+02	,000000	,00000	,1769-02	,8865-02
10	,29050+03	,60000+01	,48416+02	,00000	,00000	,15000+02	,000000	,00000	,1693-02	,8540-02
11	,27185+03	,60000+01	,45308+02	,00000	,00000	,15000+02	,000000	,00000	,1372-02	,8158-02
12	,25413+03	,60000+01	,42354+02	,00000	,00000	,15000+02	,000000	,00000	,1070-02	,7783-02

STEP 400, TIME= ,3487-01, STANDOFF DISTANCE= ,1725+00
WMAX= =,5013+00, WMIN= -,9342+00, WRANGE= ,4329+00, MAXIM PRESS= ,6257+03

STEP 401, TIME= ,3494-01, STANDOFF DISTANCE= ,1723+00
WMAX= =,4949+00, WMIN= -,9260+00, WRANGE= ,4310+00, MAXIM PRESS= ,6271+03

STEP 402, TIME= ,3500-01, STANDOFF DISTANCE= ,1720+00
WMAX= =,4895+00, WMIN= -,9178+00, WRANGE= ,4283+00, MAXIM PRESS= ,6285+03

STEP 403, TIME= ,3507-01, STANDOFF DISTANCE= ,1718+00
WMAX= =,4844+00, WMIN= -,9098+00, WRANGE= ,4254+00, MAXIM PRESS= ,6298+03

STEP 404, TIME= ,3513-01, STANDOFF DISTANCE= ,1716+00
WMAX= =,4799+00, WMIN= -,9020+00, WRANGE= ,4220+00, MAXIM PRESS= ,6312+03

STEP 405, TIME= ,3519-01, STANDOFF DISTANCE= ,1714+00
WMAX= =,4759+00, WMIN= -,8943+00, WRANGE= ,4184+00, MAXIM PRESS= ,6325+03

STEP 406, TIME= ,3526-01, STANDOFF DISTANCE= ,1711+00
WMAX= =,4721+00, WMIN= -,8867+00, WRANGE= ,4146+00, MAXIM PRESS= ,6338+03

STEP 407, TIME= ,3532-01, STANDOFF DISTANCE= ,1709+00
WMAX= =,4686+00, WMIN= -,8793+00, WRANGE= ,4107+00, MAXIM PRESS= ,6351+03

STEP 408, TIME= ,3539-01, STANDOFF DISTANCE= ,1707+00
WMAX= =,4653+00, WMIN= -,8720+00, WRANGE= ,4067+00, MAXIM PRESS= ,6364+03

STEP 409, TIME= ,3545-01, STANDOFF DISTANCE= ,1705+00
WMAX= =,4621+00, WMIN= -,8648+00, WRANGE= ,4026+00, MAXIM PRESS= ,6376+03

STEP 410, TIME= ,3552-01, STANDOFF DISTANCE= ,1703+00
WMAX= =,4591+00, WMIN= -,8576+00, WRANGE= ,3986+00, MAXIM PRESS= ,6388+03

STEP 411, TIME= ,3558-01, STANDOFF DISTANCE= ,1701+00
WMAX= =,4561+00, WMIN= -,8506+00, WRANGE= ,3945+00, MAXIM PRESS= ,6400+03

STEP 412, TIME= ,3564-01, STANDOFF DISTANCE= ,1696+00
WMAX= -,4533+00, WMIN= -,8436+00, WRANGE= ,3903+00, MAXIM PRESS= ,6412+03

STEP 413, TIME= ,3571-01, STANDOFF DISTANCE= ,1696+00
WMAX= -,4505+00, WMIN= -,8366+00, WRANGE= ,3861+00, MAXIM PRESS= ,6423+03

STEP 414, TIME= ,3577-01, STANDOFF DISTANCE= ,1694+00
WMAX= -,4479+00, WMIN= -,8302+00, WRANGE= ,3822+00, MAXIM PRESS= ,6434+03

STEP 415, TIME= ,3584-01, STANDOFF DISTANCE= ,1692+00
WMAX= -,4455+00, WMIN= -,8233+00, WRANGE= ,3778+00, MAXIM PRESS= ,6445+03

STEP 416, TIME= ,3590-01, STANDOFF DISTANCE= ,1690+00
WMAX= -,4433+00, WMIN= -,8164+00, WRANGE= ,3732+00, MAXIM PRESS= ,6456+03

STEP 417, TIME= ,3596-01, STANDOFF DISTANCE= ,1688+00
WMAX= -,4413+00, WMIN= -,8096+00, WRANGE= ,3683+00, MAXIM PRESS= ,6466+03

STEP 418, TIME= ,3603-01, STANDOFF DISTANCE= ,1686+00
WMAX= -,4396+00, WMIN= -,8027+00, WRANGE= ,3631+00, MAXIM PRESS= ,6476+03

STEP 419, TIME= ,3609-01, STANDOFF DISTANCE= ,1684+00
WMAX= -,4381+00, WMIN= -,7958+00, WRANGE= ,3576+00, MAXIM PRESS= ,6486+03

STEP 420, TIME= ,3615-01, STANDOFF DISTANCE= ,1682+00
WMAX= -,4371+00, WMIN= -,7888+00, WRANGE= ,3518+00, MAXIM PRESS= ,6496+03

STEP 421, TIME= ,3622-01, STANDOFF DISTANCE= ,1680+00
WMAX= -,4363+00, WMIN= -,7818+00, WRANGE= ,3455+00, MAXIM PRESS= ,6505+03

STEP 422, TIME= ,3628-01, STANDOFF DISTANCE= ,1678+00
WMAX= -,4360+00, WMIN= -,7747+00, WRANGE= ,3387+00, MAXIM PRESS= ,6514+03

STEP 423, TIME= ,3635-01, STANDOFF DISTANCE= ,1675+00
WMAX= -,4361+00, WMIN= -,7675+00, WRANGE= ,3315+00, MAXIM PRESS= ,6523+03

STEP 424, TIME= ,3641-01, STANDOFF DISTANCE= ,1673+00
WMAX= -,4366+00, WMIN= -,7603+00, WRANGE= ,3237+00, MAXIM PRESS= ,6532+03

STEP 425, TIME= ,3647-01, STANDOFF DISTANCE= ,1671+00
WMAX= -,4375+00, WMIN= -,7529+00, WRANGE= ,3155+00, MAXIM PRESS= ,6540+03

STEP 426, TIME= ,3654-01, STANDOFF DISTANCE= ,1669+00
WMAX= -,4387+00, WMIN= -,7454+00, WRANGE= ,3067+00, MAXIM PRESS= ,6548+03

STEP 427, TIME= ,3660-01, STANDOFF DISTANCE= ,1667+00
WMAX= -,4404+00, WMIN= -,7378+00, WRANGE= ,2974+00, MAXIM PRESS= ,6556+03

STEP 428, TIME= ,3666-01, STANDOFF DISTANCE= ,1665+00
WMAX= -,4428+00, WMIN= -,7300+00, WRANGE= ,2872+00, MAXIM PRESS= ,6564+03

STEP 429, TIME= ,3673-01, STANDOFF DISTANCE= ,1663+00
WMAX= -,4452+00, WMIN= -,7221+00, WRANGE= ,2769+00, MAXIM PRESS= ,6571+03

STEP 430, TIME= ,3679-01, STANDOFF DISTANCE= ,1661+00
WMAX= -,4476+00, WMIN= -,7140+00, WRANGE= ,2663+00, MAXIM PRESS= ,6578+03

STEP 431, TIME= ,3685-01, STANDOFF DISTANCE= ,1658+00
WMAX= -,4501+00, WMIN= -,7057+00, WRANGE= ,2556+00, MAXIM PRESS= ,6585+03

STEP 432, TIME= ,3692-01, STANDOFF DISTANCE= ,1656+00
WMAX= -,4525+00, WMIN= -,6972+00, WRANGE= ,2446+00, MAXIM PRESS= ,6591+03

STEP 433, TIME= ,3698-01, STANDOFF DISTANCE= ,1654+00
WMAX= -,4556+00, WMIN= -,6885+00, WRANGE= ,2329+00, MAXIM PRESS= ,6597+03

STEP 434, TIME= ,3704-01, STANDOFF DISTANCE= ,1652+00
WMAX= -,4586+00, WMIN= -,6796+00, WRANGE= ,2210+00, MAXIM PRESS= ,6603+03

STEP 435, TIME= ,3711-01, STANDOFF DISTANCE= ,1650+00
WMAX= -,4617+00, WMIN= -,6705+00, WRANGE= ,2088+00, MAXIM PRESS= ,6608+03

STEP 436, TIME= ,3717-01, STANDOFF DISTANCE= ,1647+00
WMAX= -,4646+00, WMIN= -,6611+00, WRANGE= ,1965+00, MAXIM PRESS= ,6613+03

STEP 437, TIME= ,3723-01, STANDOFF DISTANCE= ,1645+00
WMAX= -,4674+00, WMIN= -,6514+00, WRANGE= ,1840+00, MAXIM PRESS= ,6618+03

STEP 438, TIME= ,3729-01, STANDOFF DISTANCE= ,1643+00
WMAX= -,4700+00, WMIN= -,6415+00, WRANGE= ,1715+00, MAXIM PRESS= ,6622+03

STEP 439, TIME= ,3736-01, STANDOFF DISTANCE= ,1640+00
WMAX= -,4648+00, WMIN= -,6314+00, WRANGE= ,1666+00, MAXIM PRESS= ,6626+03

STEP 440, TIME= ,3742-01, STANDOFF DISTANCE= ,1638+00
WMAX= -,4587+00, WMIN= -,6210+00, WRANGE= ,1623+00, MAXIM PRESS= ,6630+03

STEP 441, TIME= ,3748-01, STANDOFF DISTANCE= ,1636+00
WMAX= -,4522+00, WMIN= -,6103+00, WRANGE= ,1581+00, MAXIM PRESS= ,6633+03

STEP 442, TIME= ,3754-01, STANDOFF DISTANCE= ,1633+00
WMAX= -,4453+00, WMIN= -,5993+00, WRANGE= ,1540+00, MAXIM PRESS= ,6636+03

STEP 443, TIME= ,3761-01, STANDOFF DISTANCE= ,1631+00
WMAX= -,4379+00, WMIN= -,5881+00, WRANGE= ,1502+00, MAXIM PRESS= ,6638+03

STEP 444, TIME= ,3767-01, STANDOFF DISTANCE= ,1629+00
WMAX= -,4301+00, WMIN= -,5766+00, WRANGE= ,1466+00, MAXIM PRESS= ,6640+03

STEP 445, TIME= ,3773-01, STANDOFF DISTANCE= ,1626+00
WMAX= -,4217+00, WMIN= -,5649+00, WRANGE= ,1432+00, MAXIM PRESS= ,6641+03

STEP 446, TIME= ,3779-01, STANDOFF DISTANCE= ,1624+00
WMAX= -,4129+00, WMIN= -,5529+00, WRANGE= ,1400+00, MAXIM PRESS= ,6642+03

STEP 447, TIME= ,3785-01, STANDOFF DISTANCE= ,1622+00
WMAX= -,4035+00, WMIN= -,5476+00, WRANGE= ,1441+00, MAXIM PRESS= ,6643+03

STEP 448, TIME= ,3791-01, STANDOFF DISTANCE= ,1619+00
WMAX= -,3936+00, WMIN= -,5465+00, WRANGE= ,1529+00, MAXIM PRESS= ,6643+03

STEP 449, TIME= ,3798-01, STANDOFF DISTANCE= ,1617+00
WMAX= -,3831+00, WMIN= -,5447+00, WRANGE= ,1616+00, MAXIM PRESS= ,6643+03

AT STEP 450 DT= ,2159966-03 AT N= 44, M= 3,
TIME= ,3797630-01

	Y	SHOCK VELOCITY	PSI	ZS	YS
2	,00000	-,54213+00	,00000	,11270+01	,16018-09
3	,14000+00	-,46705+00	,28530-01	,11171+01	,16258+00
4	,28000+00	-,37233+00	,49072-01	,10900+01	,32409+00
5	,42000+00	-,42071+00	,74198-01	,10435+01	,48089+00
6	,56000+00	-,43282+00	,98825-01	,98584+00	,63342+00
7	,70000+00	-,41279+00	,99086-01	,91493+00	,77891+00
8	,84000+00	-,47599+00	,11635+00	,83286+00	,91653+00
9	,98000+00	-,50091+00	,12058+00	,74659+00	,10504+01
10	,11200+01	-,47952+00	,10518+00	,65055+00	,11752+01
11	,12600+01	-,47991+00	,10805+00	,54931+00	,12938+01
12	,14000+01	-,50283+00	,11159+00	,44469+00	,14080+01

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,44174+03	,74596+02	,59218+01	,23384-07	-,44308+01	,19631+03	,43357+00	,16145+00	,3689-01
3	,43912+03	,74158+02	,59214+01	,27226-01	-,42683+01	,19821+03	,49687+00	,16292+00	,3167-01
4	,42614+03	,71996+02	,59190+01	,53977+01	-,39331+01	,20229+03	,66523+00	,16948+00	,2485-01
5	,40230+03	,68023+02	,59143+01	,78330+01	-,35794+01	,20559+03	,86391+00	,17669+00	,2724-01
6	,37824+03	,64012+02	,59089+01	,94603+01	-,31188+01	,20964+03	,10522+01	,19028+00	,2711-01
7	,34790+03	,58954+02	,59011+01	,11326+02	-,27672+01	,21535+03	,12833+01	,20445+00	,2479-01
8	,32336+03	,54866+02	,58937+01	,12545+02	-,23757+01	,21868+03	,14568+01	,21811+00	,2750-01
9	,29821+03	,50673+02	,58849+01	,13705+02	-,20788+01	,22279+03	,16461+01	,23716+00	,2777-01
10	,26911+03	,45823+02	,58728+01	,14960+02	-,19736+01	,22841+03	,18846+01	,25203+00	,2505-01
11	,24984+03	,42612+02	,58632+01	,15733+02	-,17448+01	,23181+03	,20494+01	,26672+00	,2437-01
12	,23304+03	,39812+02	,58536+01	,16359+02	-,15454+01	,23453+03	,22010+01	,28240+00	,2464-01

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,47059+03	,59313+02	,79341+01	,00000	-,35959+01	,15475+03	,39461+00	,14242+00	,2390+00
3	,46357+03	,67540+02	,68637+01	,22889+01	-,35044+01	,17761+03	,43045+00	,14372+00	,1284+00
4	,44724+03	,66270+02	,67488+01	,49252+01	-,32915+01	,18322+03	,61500+00	,14951+00	,1130+00
5	,42354+03	,60252+02	,70296+01	,67790+01	-,29706+01	,17802+03	,80586+00	,15586+00	,1529+00
6	,39702+03	,57891+02	,68582+01	,83369+01	-,26079+01	,18288+03	,97030+00	,16786+00	,1440+00
7	,36471+03	,54666+02	,66717+01	,10091+02	-,22819+01	,19018+03	,11826+01	,18035+00	,1295+00
8	,33805+03	,51690+02	,65399+01	,11326+02	-,19811+01	,19533+03	,13516+01	,19240+00	,1218+00
9	,30944+03	,48881+02	,63304+01	,12376+02	-,17502+01	,20031+03	,15109+01	,20921+00	,1141+00
10	,27856+03	,44839+02	,62124+01	,13544+02	-,16773+01	,20522+03	,17225+01	,22233+00	,1110+00
11	,25955+03	,41933+02	,61897+01	,14347+02	-,14870+01	,20886+03	,18826+01	,23528+00	,1084+00
12	,23989+03	,39041+02	,61446+01	,15081+02	-,13132+01	,21219+03	,20476+01	,24912+00	,1068+00

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,48720+03	,55186+02	,88284+01	,00000	-,32566+01	,14327+03	,37050+00	,12840+00	,2945+00
3	,48063+03	,66411+02	,72373+01	,17897+01	-,31028+01	,17244+03	,37148+00	,12957+00	,1508+00
4	,46239+03	,62264+02	,74238+01	,48025+01	-,28159+01	,17121+03	,59620+00	,13478+00	,1699+00
5	,43781+03	,62459+02	,70096+01	,64486+01	-,26221+01	,18038+03	,74444+00	,14051+00	,1367+00
6	,40963+03	,60735+02	,67444+01	,79215+01	-,22627+01	,18577+03	,89343+00	,15132+00	,1236+00
7	,37602+03	,57408+02	,65499+01	,96382+01	-,19570+01	,19188+03	,10970+01	,16259+00	,1137+00
8	,34711+03	,53379+02	,65027+01	,10832+02	-,17242+01	,19360+03	,12688+01	,17345+00	,1219+00
9	,31649+03	,50250+02	,62983+01	,11749+02	-,15327+01	,19580+03	,14125+01	,18860+00	,1252+00
10	,28475+03	,46707+02	,60964+01	,12839+02	-,14682+01	,20025+03	,15979+01	,20043+00	,1220+00
11	,26584+03	,44092+02	,60293+01	,13651+02	-,12909+01	,20423+03	,17452+01	,21211+00	,1172+00
12	,24628+03	,41426+02	,59449+01	,14402+02	-,11270+01	,20791+03	,18970+01	,22458+00	,1135+00

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AT LINE 5

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,49857+03	,97378+02	,51199+01	,00000	-,29636+01	,24784+03	,25382+00	,11728+00	-,2273+00
3	,49216+03	,86187+02	,57103+01	,24117+01	-,27414+01	,22213+03	,33239+00	,11835+00	-,9614-01
4	,47495+03	,80467+02	,59024+01	,48209+01	-,24114+01	,21570+03	,50786+00	,12311+00	-,5292-01
5	,44807+03	,80937+02	,55360+01	,71164+01	-,22468+01	,23019+03	,70106+00	,12834+00	-,1061+00
6	,41947+03	,78165+02	,53650+01	,85543+01	-,18874+01	,23384+03	,83735+00	,13822+00	-,1093+00
7	,38467+03	,73652+02	,52227+01	,10368+02	-,15766+01	,23913+03	,10328+01	,14851+00	-,1120+00
8	,35372+03	,68339+02	,51759+01	,11755+02	-,13843+01	,24091+03	,12102+01	,15843+00	-,9945-01
9	,32169+03	,63993+02	,50269+01	,12717+02	-,12144+01	,24149+03	,13489+01	,17227+00	-,8606-01
10	,28949+03	,59477+02	,48672+01	,13754+02	-,11613+01	,24396+03	,15126+01	,18308+00	-,7877-01
11	,27052+03	,55640+02	,48445+01	,14537+02	-,99501+00	,24565+03	,16471+01	,19374+00	-,7186-01
12	,25131+03	,52300+02	,48051+01	,15233+02	-,84321+00	,24720+03	,17835+01	,20513+00	-,6478-01

AT LINE 6

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,50943+03	,10569+03	,48200+01	,00000	-,25512+01	,26748+03	,20973+00	,10807+00	-,3267+00
3	,50313+03	,83438+02	,60300+01	,25921+01	-,23631+01	,21475+03	,32454+00	,10905+00	-,6011-01
4	,48642+03	,79700+02	,61032+01	,43392+01	-,20677+01	,21080+03	,45504+00	,11344+00	-,3279-01
5	,45819+03	,74175+02	,61771+01	,56769+01	-,19218+01	,20958+03	,60182+00	,11826+00	-,8792-02
6	,42820+03	,74061+02	,57801+01	,80729+01	-,16059+01	,21908+03	,80823+00	,12736+00	-,4224-01
7	,39229+03	,69086+02	,56783+01	,96141+01	-,13133+01	,21979+03	,98665+00	,13685+00	-,2702-01
8	,35902+03	,64755+02	,55443+01	,11074+02	-,11812+01	,22390+03	,11697+01	,14599+00	-,2624-01
9	,32555+03	,61272+02	,53132+01	,12088+02	-,10529+01	,22679+03	,13101+01	,15874+00	-,2413-01
10	,29290+03	,57298+02	,51119+01	,13012+02	-,10139+01	,22841+03	,14572+01	,16870+00	-,1575-01
11	,27374+03	,54256+02	,50453+01	,13716+02	-,86343+00	,23008+03	,15769+01	,17853+00	-,1088-01
12	,25450+03	,51251+02	,49658+01	,14370+02	-,72394+00	,23163+03	,16986+01	,18903+00	-,5706-02

AT LINE 7

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,51948+03	,72327+02	,71825+01	,00000	-,22496+01	,18335+03	,22356+00	,10021+00	,9103-01
3	,51416+03	,69025+02	,74489+01	,21377+01	-,20855+01	,17702+03	,30381+00	,10112+00	,1253+00
4	,49675+03	,68499+02	,72520+01	,39753+01	-,17936+01	,18076+03	,44535+00	,10519+00	,1138+00
5	,46726+03	,66481+02	,70285+01	,61928+01	-,16785+01	,18679+03	,66507+00	,10966+00	,9958-01
6	,43617+03	,64397+02	,67731+01	,74510+01	-,14071+01	,18974+03	,79859+00	,11810+00	,9649-01
7	,39871+03	,60102+02	,66340+01	,86829+01	-,11486+01	,18861+03	,95482+00	,12689+00	,1158+00
8	,36346+03	,56727+02	,64072+01	,10047+02	-,10639+01	,19285+03	,11336+01	,13537+00	,1127+00
9	,32863+03	,54653+02	,60130+01	,11157+02	-,96169+00	,19934+03	,12803+01	,14719+00	,9702-01
10	,29546+03	,52271+02	,56525+01	,12114+02	-,92385+00	,20448+03	,14202+01	,15643+00	,8720-01
11	,27616+03	,50356+02	,54841+01	,12807+02	-,78220+00	,20821+03	,15282+01	,16554+00	,8075-01
12	,25673+03	,48335+02	,53115+01	,13471+02	-,64651+00	,21178+03	,16395+01	,17527+00	,7524-01

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,53150+03	,65371+02	,81305+01	,00000	-,19962+01	,16542+03	,20867+00	,93348+01	,1795+00
3	,52655+03	,68736+02	,76605+01	,19814+01	-,18279+01	,17547+03	,27480+00	,94199+01	,1318+00
4	,50790+03	,69404+02	,73181+01	,39687+01	-,15202+01	,18254+03	,43115+00	,97989+01	,1043+00
5	,47637+03	,67666+02	,70400+01	,61909+01	-,14295+01	,18935+03	,65280+00	,10216+00	,8625-01
6	,44381+03	,63923+02	,69429+01	,73361+01	-,12147+01	,18745+03	,78605+00	,11002+00	,1063+00
7	,40436+03	,62127+02	,65085+01	,85113+01	-,97404+00	,19201+03	,91858+00	,11821+00	,9647-01
8	,36733+03	,59051+02	,62205+01	,98320+01	-,91199+00	,19638+03	,10860+01	,12610+00	,9189-01
9	,33134+03	,56359+02	,58791+01	,10983+02	-,82756+00	,20155+03	,12399+01	,13712+00	,8308-01
10	,29766+03	,53876+02	,55249+01	,11965+02	-,79915+00	,20659+03	,13808+01	,14572+00	,7398-01
11	,27817+03	,52072+02	,53421+01	,12634+02	-,66727+00	,21022+03	,14818+01	,15421+00	,6751-01
12	,25866+03	,50156+02	,51571+01	,13281+02	-,54017+00	,21371+03	,15861+01	,16328+00	,6190-01

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,54415+03	,67999+02	,80023+01	,00000	-,17406+01	,17151+03	,17839+00	,87266-01	,1485+00
3	,53900+03	,70760+02	,76152+01	,18956+01	-,15702+01	,17998+03	,24727+00	,88062-01	,1085+00
4	,51828+03	,69758+02	,74297+01	,38974+01	-,12635+01	,18279+03	,41458+00	,91605-01	,1021+00
5	,48455+03	,64928+02	,74628+01	,59242+01	-,12199+01	,18061+03	,63440+00	,95500-01	,1271+00
6	,45027+03	,63823+02	,70550+01	,71821+01	-,10459+01	,18590+03	,76781+00	,10285+00	,1122+00
7	,40910+03	,63220+02	,64711+01	,82912+01	-,82080+00	,19276+03	,88561+00	,11051+00	,8994-01
8	,37065+03	,60498+02	,61266+01	,94661+01	-,78613+00	,19636+03	,10321+01	,11789+00	,8683-01
9	,33360+03	,57070+02	,58455+01	,10547+02	-,72723+00	,19856+03	,11827+01	,12818+00	,9120-01
10	,29941+03	,54025+02	,55421+01	,11517+02	-,70855+00	,20164+03	,13268+01	,13623+00	,9107-01
11	,27973+03	,52211+02	,53578+01	,12161+02	-,68697+00	,20465+03	,14241+01	,14416+00	,8681-01
12	,26013+03	,50300+02	,51716+01	,12782+02	-,66981+00	,20755+03	,15242+01	,15264+00	,8329-01

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,55650+03	,68081+02	,81740+01	,00000	-,15059+01	,17134+03	,15425+00	,81802-01	,1488+00
3	,55069+03	,68455+02	,80446+01	,17784+01	-,13442+01	,17362+03	,22771+00	,82548-01	,1394+00
4	,52716+03	,67653+02	,77921+01	,35888+01	-,10593+01	,17613+03	,38449+00	,85869-01	,1333+00
5	,49151+03	,64167+02	,76598+01	,56618+01	-,10465+01	,17699+03	,60748+00	,89520-01	,1426+00
6	,45567+03	,63014+02	,72313+01	,70455+01	-,90138+00	,18276+03	,75623+00	,96408-01	,1262+00
7	,41305+03	,61680+02	,66967+01	,80234+01	-,70308+00	,18663+03	,86673+00	,10359+00	,1172+00
8	,37336+03	,59919+02	,62312+01	,90317+01	-,69329+00	,19082+03	,98901+00	,11051+00	,1086+00
9	,33533+03	,57870+02	,57945+01	,10117+02	-,64786+00	,19606+03	,11262+01	,12016+00	,9724-01
10	,30074+03	,55201+02	,54482+01	,11129+02	-,63238+00	,20013+03	,12680+01	,12770+00	,9225-01
11	,28094+03	,53617+02	,52398+01	,11783+02	-,51792+00	,20360+03	,13613+01	,13514+00	,8555-01
12	,26122+03	,51906+02	,50325+01	,12420+02	-,40654+00	,20697+03	,14577+01	,14308+00	,7964-01

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,56693+03	,71106+02	,79731+01	,00000	-,13087+01	,17862+03	,13116+00	,76842-01	,1122+00
3	,56029+03	,69839+02	,80227+01	,18638+01	-,11601+01	,17701+03	,22202+00	,77543-01	,1224+00
4	,53447+03	,71594+02	,74653+01	,33506+01	-,89406+00	,18500+03	,34638+00	,80662-01	,8776-01
5	,49690+03	,70563+02	,70419+01	,56639+01	-,88181+00	,19284+03	,57672+00	,84092-01	,6356-01
6	,45994+03	,66314+02	,69358+01	,71159+01	-,77108+00	,19140+03	,74284+00	,90562-01	,8377-01
7	,41608+03	,64894+02	,64118+01	,81510+01	-,59164+00	,19563+03	,85741+00	,97306-01	,7379-01
8	,37548+03	,63764+02	,58886+01	,91051+01	-,58951+00	,20104+03	,96569+00	,10381+00	,5858-01
9	,33665+03	,63051+02	,53392+01	,10185+02	-,54833+00	,20964+03	,10856+01	,11287+00	,3052-01
10	,30177+03	,60786+02	,49645+01	,11226+02	-,53846+00	,21512+03	,12183+01	,11995+00	,1911-01
11	,28187+03	,59214+02	,47602+01	,11893+02	-,42967+00	,21885+03	,13071+01	,12694+00	,1143-01
12	,26211+03	,57498+02	,45586+01	,12546+02	-,32322+00	,22250+03	,13988+01	,13441+00	,4555-02

AT LINE 12

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,57496+03	,77960+02	,73751+01	,00000	-,11234+01	,19553+03	,10753+00	,72301-01	,2768-01
3	,56747+03	,75778+02	,74885+01	,21186+01	-,99535+00	,19218+03	,22726+00	,72960-01	,4734-01
4	,54011+03	,78619+02	,68700+01	,33496+01	-,74720+00	,20244+03	,32712+00	,75895-01	,7955-03
5	,50105+03	,76505+02	,65493+01	,54964+01	-,73031+00	,20663+03	,53575+00	,79122-01	-,6622-02
6	,46325+03	,71645+02	,64659+01	,71751+01	-,64833+00	,20506+03	,71934+00	,85210-01	,1625-01
7	,41838+03	,70503+02	,59342+01	,84162+01	-,47788+00	,21179+03	,84849+00	,91555-01	-,3598-02
8	,37711+03	,68811+02	,54804+01	,93694+01	-,48191+00	,21604+03	,95586+00	,97671-01	-,1269-01
9	,33768+03	,67645+02	,49919+01	,10291+02	-,45146+00	,22216+03	,10585+01	,10620+00	-,3032-01
10	,30256+03	,65383+02	,46274+01	,11277+02	-,44840+00	,22715+03	,11796+01	,11286+00	-,4000-01
11	,28257+03	,63640+02	,44401+01	,11920+02	-,34654+00	,23021+03	,12634+01	,11944+00	-,4469-01
12	,26286+03	,61774+02	,42551+01	,12549+02	-,24707+00	,23320+03	,13496+01	,12646+00	-,4869-01

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,58082+03	,80782+02	,71900+01	,00000	-,94094+00	,20240+03	,88479-01	,68113-01	-,6763-02

3	,57277+03	,79215+02	,72305+01	,22582+01	-,83917+00	,20094+03	,22876+00	,68734-01	,3994-02
4	,54443+03	,80184+02	,67898+01	,34442+01	-,61844+00	,20658+03	,33027+00	,71500-01	-,1951-01
5	,50450+03	,75640+02	,66698+01	,50024+01	-,60728+00	,20180+03	,48968+00	,74539-01	,1366-01
6	,46588+03	,73411+02	,63462+01	,59962+01	-,53555+00	,20814+03	,69213+00	,80275-01	-,9847-03
7	,42026+03	,71866+02	,58478+01	,83045+01	-,38189+00	,21422+03	,82879+00	,86252-01	-,1709-01
8	,37839+03	,69259+02	,54635+01	,92770+01	-,40154+00	,21626+03	,94300+00	,92014-01	-,1507-01
9	,33848+03	,67061+02	,50474+01	,10021+02	-,38672+00	,21794+03	,10350+01	,10005+00	-,1323-01
10	,30317+03	,64836+02	,46759+01	,10899+02	-,38637+00	,22155+03	,11447+01	,10633+00	-,1818-01
11	,28312+03	,63096+02	,44871+01	,11487+02	-,29207+00	,22376+03	,12226+01	,11252+00	-,1983-01
12	,26346+03	,61260+02	,43007+01	,12062+02	-,20002+00	,22591+03	,13026+01	,11914+00	-,2095-01

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,58522+03	,77312+02	,75695+01	,00000	-,77570+00	,19358+03	,74560-01	,64228-01	,3692-01
3	,57702+03	,77254+02	,74692+01	,21614+01	-,69764+00	,19571+03	,21839+00	,64813-01	,2955-01
4	,54798+03	,76249+02	,71867+01	,34715+01	-,51147+00	,19678+03	,33962+00	,67421-01	,2933-01
5	,50740+03	,71744+02	,70725+01	,46007+01	-,50570+00	,19007+03	,46182+00	,70288-01	,6920-01
6	,46017+03	,71143+02	,65806+01	,56721+01	-,43732+00	,20022+03	,67005+00	,75696-01	,3526-01
7	,42199+03	,69093+02	,61075+01	,78779+01	-,30951+00	,20381+03	,80161+00	,81332-01	,2977-01
8	,37954+03	,66372+02	,57183+01	,89335+01	-,34400+00	,20589+03	,92744+00	,86765-01	,3204-01
9	,33911+03	,64017+02	,52972+01	,96581+01	-,34095+00	,20674+03	,10208+01	,94343-01	,3741-01
10	,30365+03	,61984+02	,48988+01	,10440+02	-,34118+00	,20951+03	,11213+01	,10026+00	,3479-01
11	,28356+03	,60420+02	,46931+01	,10978+02	-,25255+00	,21134+03	,11940+01	,10610+00	,3382-01
12	,26395+03	,58775+02	,44908+01	,11506+02	-,16580+00	,21314+03	,12685+01	,11234+00	,3329-01

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,58875+03	,72750+02	,80927+01	,00000	-,63545+00	,18208+03	,62965-01	,60604-01	,9403-01
3	,58067+03	,73539+02	,78961+01	,19779+01	-,57399+00	,18597+03	,20297+00	,61157-01	,7739-01
4	,55121+03	,71952+02	,76608+01	,34586+01	-,41726+00	,18595+03	,34710+00	,63617-01	,8312-01
5	,50987+03	,68959+02	,73939+01	,45164+01	-,41032+00	,18268+03	,46155+00	,66322-01	,1054+00
6	,47021+03	,68233+02	,68912+01	,54104+01	-,35107+00	,19119+03	,65686+00	,71425-01	,7769-01
7	,42359+03	,66123+02	,64061+01	,75325+01	-,24566+00	,19371+03	,78331+00	,76744-01	,7625-01
8	,38061+03	,63737+02	,59715+01	,86984+01	-,28804+00	,19722+03	,92133+00	,81870-01	,7226-01
9	,33960+03	,61737+02	,55008+01	,95071+01	-,29332+00	,19958+03	,10231+01	,89021-01	,7097-01
10	,30402+03	,59875+02	,50775+01	,10232+02	-,29499+00	,20208+03	,11181+01	,94606-01	,6868-01
11	,28390+03	,58494+02	,48536+01	,10748+02	-,20922+00	,20400+03	,11877+01	,10012+00	,6679-01
12	,26431+03	,57030+02	,46345+01	,11251+02	-,12492+00	,20588+03	,12592+01	,10600+00	,6531-01

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,59194+03	,70358+02	,84133+01	,00000	-,51387+00	,17603+03	,51776-01	,57209-01	,1240+00
3	,58399+03	,71036+02	,82210+01	,18446+01	-,46269+00	,17940+03	,19070+00	,57731-01	,1097+00
4	,55423+03	,69631+02	,79595+01	,34733+01	-,32705+00	,18016+03	,35334+00	,60054-01	,1119+00
5	,51196+03	,67799+02	,75512+01	,46522+01	-,31659+00	,18037+03	,47862+00	,62607-01	,1177+00
6	,47198+03	,66567+02	,70904+01	,52864+01	-,27124+00	,18621+03	,65180+00	,67424-01	,1013+00
7	,42495+03	,64589+02	,65794+01	,74334+01	-,17930+00	,18912+03	,78194+00	,72445-01	,9803-01
8	,38152+03	,62433+02	,61110+01	,86771+01	-,22596+00	,19375+03	,92844+00	,77284-01	,8921-01
9	,33996+03	,60709+02	,55999+01	,95659+01	-,23986+00	,19755+03	,10379+01	,84034-01	,8182-01
10	,30428+03	,58916+02	,51646+01	,10274+02	-,24387+00	,20010+03	,11316+01	,89306-01	,7914-01
11	,28415+03	,57635+02	,49302+01	,10787+02	-,15884+00	,20228+03	,12010+01	,94509-01	,7596-01
12	,26454+03	,56267+02	,47016+01	,11292+02	-,75058-01	,20442+03	,12723+01	,10007+00	,7320-01

AT LINE 17

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,59511+03	,70026+02	,84984+01	,00000	-,40546+00	,17515+03	,40950-01	,54016-01	,1284+00
3	,58707+03	,70074+02	,83778+01	,17869+01	-,35976+00	,17685+03	,18403+00	,54508-01	,1221+00
4	,55707+03	,68976+02	,80764+01	,35279+01	-,23954+00	,17869+03	,35984+00	,56702-01	,1195+00

5	,51372+03	,67433+02	,76162+01	,48261+01	-,22780+00	,18025+03	,49725+00	,59112-01	,1194+00
6	,47343+03	,66003+02	,71728+01	,52711+01	-,19527+00	,18469+03	,65269+00	,63661-01	,1087+00
7	,42600+03	,64056+02	,66504+01	,75074+01	-,10994+00	,18833+03	,79285+00	,68401-01	,1027+00
8	,38224+03	,61930+02	,61721+01	,87733+01	-,16170+00	,19332+03	,94237+00	,72970-01	,9252-01
9	,34019+03	,60270+02	,56444+01	,96883+01	-,18607+00	,19763+03	,10550+01	,79343-01	,8311-01
10	,30442+03	,58454+02	,52078+01	,10407+02	-,19220+00	,20031+03	,11507+01	,84321-01	,8003-01
11	,28428+03	,57183+02	,49715+01	,10931+02	-,10703+00	,20270+03	,12217+01	,89234-01	,7605-01
12	,26465+03	,55821+02	,47411+01	,11446+02	-,23146-01	,20506+03	,12948+01	,94481-01	,7251-01

AT LINE 18

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,59834+03	,70554+02	,84806+01	,00000	-,30921+00	,17643+03	,31112-01	,51002-01	,1219+00
3	,58997+03	,69916+02	,84382+01	,17760+01	-,26486+00	,17640+03	,18149+00	,51467-01	,1243+00
4	,55979+03	,68993+02	,81138+01	,35917+01	-,15820+00	,17894+03	,36581+00	,53537-01	,1185+00
5	,51528+03	,67224+02	,76652+01	,49306+01	-,14783+00	,18023+03	,50847+00	,55814-01	,1203+00
6	,47460+03	,65851+02	,72072+01	,63021+01	-,12322+00	,18449+03	,65648+00	,60108-01	,1100+00
7	,42678+03	,63768+02	,66926+01	,76187+01	-,41746-01	,18844+03	,80635+00	,64584-01	,1033+00
8	,38274+03	,61596+02	,62137+01	,88632+01	-,10110+00	,19327+03	,95450+00	,68898-01	,9389-01
9	,34029+03	,59906+02	,56804+01	,97574+01	-,13719+00	,19738+03	,10656+01	,74915-01	,8531-01
10	,30444+03	,58023+02	,52469+01	,10497+02	-,14442+00	,20017+03	,11648+01	,79616-01	,8209-01
11	,28431+03	,56708+02	,50136+01	,11033+02	-,59210-01	,20264+03	,12383+01	,84254-01	,7797-01
12	,26466+03	,55300+02	,47858+01	,11560+02	,24536-01	,20507+03	,13138+01	,89208-01	,7434-01

AT LINE 19

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,60161+03	,71069+02	,84652+01	,00000	-,22488+00	,17770+03	,22545-01	,48147-01	,1156+00
3	,59272+03	,69933+02	,84755+01	,17793+01	-,17863+00	,17643+03	,18073+00	,48586-01	,1241+00
4	,56249+03	,69040+02	,81472+01	,36313+01	-,86035-01	,17920+03	,36946+00	,50541-01	,1175+00
5	,51680+03	,66977+02	,77161+01	,49503+01	-,77700-01	,17970+03	,51130+00	,52690-01	,1230+00
6	,47565+03	,65683+02	,72415+01	,63297+01	-,56406-01	,18424+03	,66010+00	,56744-01	,1115+00
7	,42737+03	,63404+02	,67404+01	,76780+01	,21092-01	,18799+03	,81494+00	,60969-01	,1063+00
8	,38307+03	,61209+02	,62585+01	,88820+01	-,47392-01	,19247+03	,95951+00	,65042-01	,9813-01
9	,34026+03	,59491+02	,57195+01	,97331+01	-,94968-01	,19610+03	,10666+01	,70722-01	,9132-01
10	,30436+03	,57532+02	,52903+01	,10494+02	-,10203+00	,19890+03	,11694+01	,75180-01	,8834-01
11	,28424+03	,56159+02	,50614+01	,11039+02	-,17288-01	,20133+03	,12450+01	,79538-01	,8457-01
12	,26459+03	,54695+02	,48374+01	,11574+02	,65768-01	,20372+03	,13226+01	,84215-01	,8129-01

AT LINE 20

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,60484+03	,71302+02	,84829+01	,00000	-,15010+00	,17827+03	,15024-01	,45436-01	,1127+00
3	,59538+03	,69889+02	,85189+01	,17788+01	-,10056+00	,17631+03	,18012+00	,45851-01	,1247+00
4	,56522+03	,68955+02	,81970+01	,36332+01	-,23276-01	,17899+03	,36978+00	,47695-01	,1185+00
5	,51837+03	,66717+02	,77697+01	,49119+01	-,16321-01	,17886+03	,50823+00	,49723-01	,1269+00
6	,47669+03	,65417+02	,72870+01	,63276+01	,35338-02	,18356+03	,66119+00	,53549-01	,1148+00
7	,42788+03	,62984+02	,67935+01	,76614+01	,75958-01	,18681+03	,81593+00	,57536-01	,1119+00
8	,38329+03	,60817+02	,63024+01	,88217+01	-,13689-02	,19095+03	,95604+00	,61380-01	,1049+00
9	,34013+03	,59090+02	,57561+01	,96269+01	-,58839-01	,19407+03	,10585+01	,66741-01	,9998-01
10	,30421+03	,57049+02	,53324+01	,10406+02	-,64416-01	,19676+03	,11644+01	,70928-01	,9764-01
11	,28410+03	,55628+02	,51071+01	,10956+02	,19243-01	,19909+03	,12415+01	,75060-01	,9443-01
12	,26444+03	,54119+02	,48863+01	,11494+02	,10105+00	,20136+03	,13206+01	,79474-01	,9172-01

AT LINE 21

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,60789+03	,71310+02	,85245+01	,00000	-,81067-01	,17828+03	,81134-02	,42856-01	,1127+00
3	,59795+03	,69779+02	,85692+01	,17687+01	-,29477-01	,17601+03	,17897+00	,43246-01	,1262+00
4	,56794+03	,68791+02	,82561+01	,36005+01	,31461-01	,17846+03	,36690+00	,44986-01	,1210+00
5	,51996+03	,66493+02	,78198+01	,48405+01	,37759-01	,17795+03	,50171+00	,46899-01	,1310+00
6	,47775+03	,65114+02	,73372+01	,62867+01	,55576-01	,18255+03	,65847+00	,50508-01	,1195+00

7	,42642*03	,62607*02	,68431*01	,75801*01	,12239*00	,18525*03	,80976*00	,54268-01	,1188*00
8	,38346*03	,60511*02	,63371*01	,86975*01	,37189-01	,18910*03	,94497*00	,57894-01	,1126*00
9	,33996*03	,58774*02	,57842*01	,94615*01	-,27756-01	,19170*03	,10431*01	,62950-01	,1095*00
10	,30399*03	,56643*02	,53669*01	,10257*02	-,30566-01	,19421*03	,11518*01	,66900-01	,1082*00
11	,28389*03	,55192*02	,51437*01	,10809*02	,51592-01	,19640*03	,12297*01	,70797-01	,1055*00
12	,26424*03	,53656*02	,49248*01	,11349*02	,13180*00	,19854*03	,13094*01	,74960-01	,1034*00

AT LINE 22

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,61059*03	,71212*02	,85743*01	,00000	-,15324-01	,17803*03	,15348-02	,40393-01	,1139*00
3	,60043*03	,69656*02	,86200*01	,17489*01	,34675-01	,17567*03	,17714*00	,40761-01	,1278*00
4	,57055*03	,68622*02	,83144*01	,35422*01	,79433-01	,17783*03	,36149*00	,42401-01	,1238*00
5	,52150*03	,66323*02	,78631*01	,47515*01	,85783-01	,17710*03	,49319*00	,44204-01	,1346*00
6	,47882*03	,64846*02	,73840*01	,52082*01	,10039*00	,18139*03	,65166*00	,47605-01	,1246*00
7	,42904*03	,62333*02	,68831*01	,74524*01	,16079*00	,18361*03	,79795*00	,51150-01	,1256*00
8	,38368*03	,60335*02	,63591*01	,85271*01	,69066-01	,18719*03	,92783*00	,54567-01	,1200*00
9	,33980*03	,58568*02	,58018*01	,92563*01	-,10230-02	,18926*03	,10222*01	,59333-01	,1189*00
10	,30375*03	,56341*02	,53913*01	,10070*02	,87783-04	,19155*03	,11338*01	,63055-01	,1187*00
11	,28366*03	,54887*02	,51680*01	,10620*02	,80731-01	,19361*03	,12115*01	,66729-01	,1165*00
12	,26402*03	,53348*02	,49491*01	,11157*02	,15941*00	,19562*03	,12911*01	,70653-01	,1149*00

AT LINE 23

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,61295*03	,71085*02	,86229*01	,00000	,46458-01	,17771*03	,46570-02	,38038-01	,1155*00
3	,60286*03	,69551*02	,86679*01	,17210*01	,91487-01	,17536*03	,17466*00	,38385-01	,1293*00
4	,57302*03	,68485*02	,83671*01	,34665*01	,12132*00	,17723*03	,35424*00	,39929-01	,1264*00
5	,52297*03	,66203*02	,78995*01	,46511*01	,12856*00	,17633*03	,48330*00	,41627-01	,1377*00
6	,47986*03	,64643*02	,74232*01	,50979*01	,13926*00	,18021*03	,64117*00	,44830-01	,1295*00
7	,42973*03	,62172*02	,69121*01	,72928*01	,19226*00	,18204*03	,78196*00	,48168-01	,1318*00
8	,38397*03	,60282*02	,63695*01	,83242*01	,95214-01	,18536*03	,90617*00	,51386-01	,1267*00
9	,33968*03	,58459*02	,58105*01	,90250*01	,21677-01	,18687*03	,99760*00	,55874-01	,1278*00
10	,30351*03	,56148*02	,54056*01	,98586*01	,27553-01	,18897*03	,11120*01	,59379-01	,1286*00
11	,28342*03	,54720*02	,51794*01	,10403*02	,10679*00	,19092*03	,11886*01	,62839-01	,1267*00
12	,26381*03	,53210*02	,49579*01	,10939*02	,18415*00	,19282*03	,12670*01	,66534-01	,1253*00

AT LINE 24

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,61522*03	,70968*02	,86689*01	,00000	,10129*00	,17743*03	,10162-01	,35782-01	,1169*00
3	,60541*03	,69479*02	,87136*01	,16866*01	,13913*00	,17513*03	,17159*00	,36108-01	,1304*00
4	,57547*03	,68391*02	,84145*01	,33792*01	,15650*00	,17670*03	,34571*00	,37561-01	,1287*00
5	,52446*03	,66128*02	,79309*01	,45415*01	,16553*00	,17565*03	,47231*00	,39158-01	,1404*00
6	,48091*03	,64513*02	,74544*01	,59627*01	,17272*00	,17907*03	,62768*00	,42171-01	,1340*00
7	,43047*03	,62111*02	,69307*01	,71109*01	,21805*00	,18058*03	,76292*00	,45311-01	,1372*00
8	,38433*03	,60329*02	,63706*01	,80982*01	,11650*00	,18362*03	,88126*00	,48338-01	,1327*00
9	,33963*03	,58430*02	,58125*01	,87776*01	,40702-01	,18460*03	,97051*00	,52560-01	,1360*00
10	,30331*03	,56059*02	,54105*01	,96323*01	,51765-01	,18654*03	,10873*01	,55858-01	,1375*00
11	,28320*03	,54690*02	,51783*01	,10165*02	,12950*00	,18840*03	,11618*01	,59112-01	,1358*00
12	,26361*03	,53239*02	,49515*01	,10686*02	,20554*00	,19021*03	,12379*01	,62588-01	,1345*00

AT LINE 25

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,61781*03	,70885*02	,87157*01	,00000	,14543*00	,17722*03	,14599-01	,33617-01	,1179*00
3	,60828*03	,69444*02	,87593*01	,16471*01	,17645*00	,17498*03	,16800*00	,33923-01	,1310*00
4	,57808*03	,68339*02	,84590*01	,32840*01	,18369*00	,17626*03	,33627*00	,35288-01	,1304*00
5	,52613*03	,66095*02	,79602*01	,44239*01	,19510*00	,17504*03	,46034*00	,36789-01	,1427*00
6	,48203*03	,64450*02	,74792*01	,58088*01	,20016*00	,17802*03	,61188*00	,39619-01	,1380*00
7	,43126*03	,62132*02	,69410*01	,69131*01	,23880*00	,17925*03	,74167*00	,42569-01	,1418*00
8	,38477*03	,60451*02	,63649*01	,78559*01	,13360*00	,18199*03	,85408*00	,45413-01	,1381*00

9	,33964+03	,58462+02	,58097+01	,85203+01	,56559-01	,18246+03	,94187+00	,49379-01	,1435+00
10	,30315+03	,56072+02	,54066+01	,93946+01	,72757-01	,18431+03	,10604+01	,52477-01	,1454+00
11	,28303+03	,54791+02	,51657+01	,99093+01	,14865+00	,18609+03	,11315+01	,55535-01	,1436+00
12	,26347+03	,53429+02	,49311+01	,10414+02	,22314+00	,18783+03	,12044+01	,58800-01	,1423+00

AT LINE 26

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,62107+03	,70843+02	,87669+01	,00000	,17596+00	,17712+03	,17668-01	,31535-01	,1184+00
3	,61155+03	,69442+02	,88067+01	,16034+01	,20311+00	,17491+03	,16392+00	,31823-01	,1313+00
4	,58096+03	,68326+02	,85028+01	,31835+01	,20203+00	,17590+03	,32615+00	,33103-01	,1317+00
5	,52814+03	,66102+02	,79898+01	,42992+01	,21568+00	,17452+03	,44747+00	,34511-01	,1445+00
6	,48336+03	,64448+02	,74999+01	,56411+01	,22036+00	,17706+03	,59433+00	,37166-01	,1414+00
7	,43213+03	,62219+02	,69453+01	,67036+01	,25422+00	,17805+03	,71878+00	,39933-01	,1458+00
8	,38527+03	,60628+02	,63547+01	,76020+01	,14676+00	,18048+03	,82530+00	,42601-01	,1428+00
9	,33972+03	,58545+02	,58028+01	,82592+01	,69705-01	,18047+03	,91232+00	,46322-01	,1502+00
10	,30306+03	,56180+02	,53945+01	,91476+01	,90649-01	,18229+03	,10315+01	,49228-01	,1522+00
11	,28291+03	,55012+02	,51426+01	,96381+01	,16424+00	,18399+03	,10984+01	,52096-01	,1503+00
12	,26337+03	,53765+02	,48985+01	,10122+02	,23677+00	,18566+03	,11669+01	,55159-01	,1488+00

AT LINE 27

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,62506+03	,70840+02	,88235+01	,00000	,19267+00	,17712+03	,19346-01	,29531-01	,1185+00
3	,61518+03	,69466+02	,88559+01	,15565+01	,22021+00	,17490+03	,15941+00	,29800-01	,1312+00
4	,58411+03	,68343+02	,85467+01	,30790+01	,21195+00	,17562+03	,31552+00	,31000-01	,1327+00
5	,53053+03	,66146+02	,80206+01	,41682+01	,22690+00	,17408+03	,43378+00	,32318-01	,1460+00
6	,48495+03	,64500+02	,75185+01	,54631+01	,23253+00	,17620+03	,57543+00	,34804-01	,1443+00
7	,43316+03	,62362+02	,69459+01	,64852+01	,26352+00	,17697+03	,69464+00	,37396-01	,1491+00
8	,38589+03	,60849+02	,63417+01	,73399+01	,15568+00	,17907+03	,79543+00	,39894-01	,1470+00
9	,33987+03	,58675+02	,57924+01	,79953+01	,80288-01	,17865+03	,88220+00	,43378-01	,1562+00
10	,30301+03	,56379+02	,53745+01	,88918+01	,10558+00	,18049+03	,10009+01	,46100-01	,1579+00
11	,28283+03	,55343+02	,51104+01	,93524+01	,17641+00	,18211+03	,10627+01	,48785-01	,1558+00
12	,26332+03	,54232+02	,48555+01	,98086+01	,24656+00	,18371+03	,11260+01	,51654-01	,1541+00

AT LINE 28

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,62955+03	,70866+02	,88837+01	,00000	,19830+00	,17718+03	,19909-01	,27599-01	,1181+00
3	,61896+03	,69506+02	,89052+01	,15069+01	,23014+00	,17493+03	,15454+00	,27851-01	,1310+00
4	,58738+03	,68382+02	,85896+01	,29715+01	,21543+00	,17539+03	,30449+00	,28971-01	,1333+00
5	,53320+03	,66219+02	,80521+01	,40316+01	,23022+00	,17370+03	,41940+00	,30203-01	,1470+00
6	,48680+03	,64598+02	,75358+01	,52775+01	,23719+00	,17545+03	,55551+00	,32527-01	,1466+00
7	,43443+03	,62554+02	,69449+01	,62600+01	,26611+00	,17601+03	,66954+00	,34949-01	,1518+00
8	,38666+03	,61109+02	,63274+01	,70723+01	,15985+00	,17779+03	,76481+00	,37284-01	,1507+00
9	,34009+03	,58851+02	,57789+01	,77303+01	,88081-01	,17701+03	,85169+00	,40540-01	,1615+00
10	,30301+03	,56664+02	,53474+01	,86272+01	,11750+00	,17888+03	,96871+00	,43084-01	,1626+00
11	,28279+03	,55774+02	,50703+01	,90528+01	,18521+00	,18043+03	,10247+01	,45594-01	,1603+00
12	,26332+03	,54813+02	,48040+01	,94766+01	,25264+00	,18197+03	,10822+01	,48275-01	,1582+00

AT LINE 29

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63415+03	,70904+02	,89438+01	,00000	,19738+00	,17728+03	,19811-01	,25734-01	,1177+00
3	,62266+03	,69551+02	,89525+01	,14551+01	,23582+00	,17497+03	,14939+00	,25969-01	,1307+00
4	,59054+03	,68431+02	,86297+01	,28616+01	,21532+00	,17520+03	,29319+00	,27014-01	,1339+00
5	,53596+03	,66312+02	,80824+01	,38902+01	,22843+00	,17337+03	,40444+00	,28162-01	,1479+00
6	,48881+03	,64733+02	,75511+01	,50857+01	,23612+00	,17479+03	,53480+00	,30329-01	,1484+00
7	,43591+03	,62786+02	,69427+01	,60294+01	,26234+00	,17518+03	,64370+00	,32587-01	,1540+00
8	,38760+03	,61401+02	,63126+01	,68005+01	,15912+00	,17664+03	,73368+00	,34764-01	,1537+00
9	,34042+03	,59073+02	,57626+01	,74644+01	,92674-01	,17555+03	,82086+00	,37800-01	,1659+00
10	,30307+03	,57031+02	,53140+01	,83536+01	,12602+00	,17748+03	,93499+00	,40172-01	,1663+00

11	,28281*03	,56294*02	,50237*01	,87399*01	,19041*00	,17895*03	,98473*00	,42512-01	,1637*00
12	,26337*03	,55495*02	,47458*01	,91269*01	,25490*00	,18042*03	,10359*01	,45012-01	,1613*00

AT LINE 30

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,63650*03	,70943*02	,90002*01	,00000	,19440*00	,17738*03	,19506-01	,23931-01	,1172*00
3	,62608*03	,69596*02	,89959*01	,14016*01	,23966*00	,17500*03	,14406*00	,24150-01	,1304*00
4	,59342*03	,68463*02	,86652*01	,27500*01	,21414*00	,17501*03	,28170*00	,25121-01	,1343*00
5	,53861*03	,66416*02	,81095*01	,37446*01	,22444*00	,17308*03	,38905*00	,26189-01	,1485*00
6	,49080*03	,64892*02	,75633*01	,44896*01	,23176*00	,17421*03	,51357*00	,28204-01	,1499*00
7	,43750*03	,63050*02	,69390*01	,57944*01	,25374*00	,17445*03	,61733*00	,30305-01	,1557*00
8	,38867*03	,61722*02	,62971*01	,65262*01	,15418*00	,17561*03	,70225*00	,32329-01	,1562*00
9	,34085*03	,59342*02	,57439*01	,71976*01	,93840-01	,17426*03	,78973*00	,35153-01	,1695*00
10	,30321*03	,57476*02	,52754*01	,80708*01	,13059*00	,17627*03	,89984*00	,37358-01	,1690*00
11	,28290*03	,56897*02	,49720*01	,84146*01	,19158*00	,17766*03	,94306*00	,39535-01	,1661*00
12	,26347*03	,56265*02	,46827*01	,87610*01	,25303*00	,17907*03	,98754*00	,41859-01	,1633*00

AT LINE 31

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,64236*03	,70972*02	,90509*01	,00000	,19223*00	,17745*03	,19284-01	,22187-01	,1168*00
3	,62916*03	,69635*02	,90350*01	,13466*01	,24272*00	,17502*03	,13858*00	,22390-01	,1302*00
4	,59590*03	,68531*02	,86954*01	,26368*01	,21321*00	,17483*03	,27007*00	,23290-01	,1348*00
5	,54098*03	,66525*02	,81320*01	,35959*01	,22018*00	,17280*03	,37329*00	,24281-01	,1491*00
6	,49262*03	,65067*02	,75710*01	,46896*01	,22627*00	,17369*03	,49192*00	,26149-01	,1512*00
7	,43906*03	,63336*02	,69322*01	,55555*01	,24271*00	,17380*03	,59054*00	,28096-01	,1569*00
8	,38979*03	,62065*02	,62803*01	,62502*01	,14650*00	,17471*03	,67069*00	,29973-01	,1582*00
9	,34139*03	,59658*02	,57224*01	,69288*01	,91815-01	,17315*03	,75823*00	,32591-01	,1723*00
10	,30346*03	,57996*02	,52324*01	,77788*01	,13089*00	,17525*03	,86340*00	,34635-01	,1708*00
11	,28307*03	,57576*02	,49165*01	,80779*01	,18842*00	,17658*03	,89998*00	,36653-01	,1675*00
12	,26364*03	,57112*02	,46163*01	,83811*01	,24672*00	,17793*03	,93769*00	,38808-01	,1644*00

AT LINE 32

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,64567*03	,70992*02	,90950*01	,00000	,19161*00	,17750*03	,19219*01	,20498-01	,1166*00
3	,63192*03	,69671*02	,90701*01	,12905*01	,24464*00	,17504*03	,13300*00	,20685-01	,1300*00
4	,59801*03	,68577*02	,87203*01	,25226*01	,21241*00	,17465*03	,25836*00	,21517-01	,1353*00
5	,54305*03	,66635*02	,81496*01	,34443*01	,21614*00	,17254*03	,35730*00	,22432-01	,1497*00
6	,49418*03	,65251*02	,75736*01	,44871*01	,22091*00	,17322*03	,47004*00	,24158-01	,1522*00
7	,44041*03	,63633*02	,69212*01	,53142*01	,23166*00	,17323*03	,56357*00	,25957-01	,1579*00
8	,39084*03	,62425*02	,62610*01	,59736*01	,13787*00	,17391*03	,63915*00	,27690-01	,1598*00
9	,34196*03	,60017*02	,56978*01	,66576*01	,87447-01	,17221*03	,72636*00	,30109-01	,1744*00
10	,30378*03	,58585*02	,51853*01	,74780*01	,12724*00	,17443*03	,82583*00	,31998-01	,1716*00
11	,28332*03	,58322*02	,48580*01	,77309*01	,18108*00	,17570*03	,85580*00	,33862-01	,1680*00
12	,26388*03	,58026*02	,45477*01	,79887*01	,23597*00	,17700*03	,88673*00	,35853-01	,1644*00

AT LINE 33

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,64849*03	,71000*02	,91337*01	,00000	,19160*00	,17752*03	,19218*01	,18860-01	,1165*00
3	,63447*03	,69703*02	,91025*01	,12335*01	,24432*00	,17505*03	,12729*00	,19032-01	,1299*00
4	,59984*03	,68620*02	,87415*01	,24074*01	,21070*00	,17447*03	,24656*00	,19797-01	,1358*00
5	,54486*03	,66747*02	,81631*01	,32901*01	,21167*00	,17230*03	,34106*00	,20639-01	,1501*00
6	,49549*03	,65441*02	,75715*01	,42822*01	,21578*00	,17280*03	,44795*00	,22227-01	,1530*00
7	,44148*03	,63934*02	,69051*01	,50703*01	,22208*00	,17271*03	,53644*00	,23882-01	,1587*00
8	,39174*03	,62795*02	,62385*01	,56961*01	,12971*00	,17322*03	,60767*00	,25478-01	,1609*00
9	,34251*03	,60416*02	,56692*01	,63826*01	,81917-01	,17141*03	,69406*00	,27703-01	,1758*00
10	,30414*03	,59235*02	,51345*01	,71685*01	,12057*00	,17379*03	,78729*00	,29441-01	,1716*00
11	,28362*03	,59125*02	,47970*01	,73745*01	,17030*00	,17502*03	,81078*00	,31156-01	,1676*00
12	,26417*03	,58993*02	,44781*01	,75857*01	,22128*00	,17628*03	,83506*00	,32988-01	,1636*00

AT LINE 34

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.65093+03	.71008+02	.91677+01	.00000	.19068+00	.17754+03	.19125-01	.17270-01	.1164+00
3	.63699+03	.69741+02	.91323+01	.11760+01	.24081+00	.17507+03	.12149+00	.17428-01	.1296+00
4	.60147+03	.68668+02	.87591+01	.22925+01	.20702+00	.17432+03	.23474+00	.18129-01	.1361+00
5	.54651+03	.66865+02	.81732+01	.31348+01	.20572+00	.17210+03	.32470+00	.18900-01	.1504+00
6	.49659+03	.65641+02	.75652+01	.40766+01	.21012+00	.17243+03	.42582+00	.20354-01	.1536+00
7	.44223+03	.64240+02	.68839+01	.48255+01	.21420+00	.17227+03	.50933+00	.21869-01	.1592+00
8	.39244+03	.63174+02	.62121+01	.54193+01	.12274+00	.17263+03	.57639+00	.23330-01	.1617+00
9	.34296+03	.60853+02	.56360+01	.61050+01	.76433-01	.17077+03	.66148+00	.25368-01	.1765+00
10	.30448+03	.59943+02	.50795+01	.68514+01	.11218+00	.17333+03	.74800+00	.26959-01	.1707+00
11	.28392+03	.59982+02	.47334+01	.76100+01	.15721+00	.17454+03	.76516+00	.28530-01	.1662+00
12	.26447+03	.60012+02	.44071+01	.71734+01	.20359+00	.17578+03	.78292+00	.30208-01	.1617+00

AT LINE 35

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.65326+03	.71001+02	.92006+01	.00000	.18748+00	.17752+03	.18804-01	.15726-01	.1165+00
3	.63924+03	.69767+02	.91624+01	.11175+01	.23369+00	.17507+03	.11552+00	.15869-01	.1296+00
4	.60298+03	.68707+02	.87761+01	.21756+01	.20068+00	.17416+03	.22277+00	.16508-01	.1366+00
5	.54804+03	.66980+02	.81821+01	.29769+01	.19745+00	.17190+03	.30809+00	.17210-01	.1507+00
6	.49755+03	.65841+02	.75569+01	.38682+01	.20281+00	.17210+03	.40346+00	.18534-01	.1541+00
7	.44273+03	.64543+02	.68594+01	.45783+01	.20702+00	.17186+03	.48212+00	.19914-01	.1595+00
8	.39294+03	.63552+02	.61829+01	.51413+01	.11674+00	.17210+03	.54520+00	.21244-01	.1622+00
9	.34329+03	.61315+02	.55988+01	.58223+01	.71570-01	.17024+03	.62846+00	.23100-01	.1768+00
10	.30473+03	.60683+02	.50217+01	.65260+01	.10320+00	.17301+03	.70812+00	.24549-01	.1692+00
11	.28417+03	.60861+02	.46691+01	.66376+01	.14292+00	.17419+03	.71924+00	.25979-01	.1643+00
12	.26474+03	.61040+02	.43372+01	.67530+01	.18402+00	.17542+03	.73078+00	.27507-01	.1593+00

AT LINE 36

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.65537+03	.71023+02	.92276+01	.00000	.18149+00	.17757+03	.18201-01	.14225-01	.1162+00
3	.64145+03	.69821+02	.91871+01	.10595+01	.22341+00	.17514+03	.10952+00	.14355-01	.1291+00
4	.60434+03	.68772+02	.87876+01	.20604+01	.19189+00	.17407+03	.21089+00	.14932-01	.1366+00
5	.54947+03	.67119+02	.81865+01	.28201+01	.18688+00	.17179+03	.29156+00	.15567-01	.1506+00
6	.49844+03	.66067+02	.75445+01	.36616+01	.19327+00	.17189+03	.38126+00	.16765-01	.1540+00
7	.44307+03	.64867+02	.68305+01	.43331+01	.19922+00	.17157+03	.45518+00	.18013-01	.1594+00
8	.39327+03	.63959+02	.61488+01	.48659+01	.11119+00	.17174+03	.51435+00	.19217-01	.1620+00
9	.34347+03	.61828+02	.55552+01	.55392+01	.67558-01	.16991+03	.59542+00	.20895-01	.1761+00
10	.30487+03	.61499+02	.49573+01	.61958+01	.94529-01	.17295+03	.66781+00	.22208-01	.1665+00
11	.28433+03	.61818+02	.45994+01	.62598+01	.12854+00	.17414+03	.67302+00	.23500-01	.1611+00
12	.26494+03	.62147+02	.42631+01	.63262+01	.16388+00	.17539+03	.67845+00	.24882-01	.1555+00

AT LINE 37

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	.65730+03	.70962+02	.92627+01	.00000	.17264+00	.17742+03	.17321-01	.12765-01	.1170+00
3	.64346+03	.69795+02	.92194+01	.99951+00	.21052+00	.17501+03	.10333+00	.12881-01	.1297+00
4	.60550+03	.68764+02	.88054+01	.19421+01	.18102+00	.17381+03	.19879+00	.13400-01	.1376+00
5	.55075+03	.67196+02	.81962+01	.26586+01	.17429+00	.17154+03	.27469+00	.13969-01	.1513+00
6	.49925+03	.66239+02	.75371+01	.34499+01	.18102+00	.17156+03	.35875+00	.15044-01	.1546+00
7	.44334+03	.65137+02	.68063+01	.40827+01	.18913+00	.17120+03	.42799+00	.16164-01	.1598+00
8	.39350+03	.64303+02	.61194+01	.45857+01	.10477+00	.17128+03	.48343+00	.17244-01	.1625+00
9	.34354+03	.62297+02	.55146+01	.52464+01	.63317-01	.16951+03	.56182+00	.18750-01	.1759+00
10	.30489+03	.62235+02	.48990+01	.58543+01	.85735-01	.17273+03	.62731+00	.19927-01	.1647+00
11	.28438+03	.62661+02	.45384+01	.58727+01	.11396+00	.17390+03	.62713+00	.21088-01	.1590+00
12	.26503+03	.63106+02	.41998+01	.59914+01	.14338+00	.17513+03	.62697+00	.22328-01	.1530+00

AT LINE 38

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,65897+03	,71045+02	,92753+01	,00000	,16226+00	,17763+03	,16270-01	,11343-01	,1159+00
3	,64517+03	,69904+02	,92293+01	,94230+00	,19657+00	,17522+03	,97303-01	,11447-01	,1285+00
4	,60637+03	,68880+02	,88034+01	,18291+01	,16953+00	,17389+03	,18706+00	,11907-01	,1369+00
5	,55180+03	,67307+02	,81886+01	,25031+01	,16116+00	,17161+03	,25827+00	,12414-01	,1503+00
6	,49995+03	,66532+02	,75145+01	,32461+01	,16722+00	,17161+03	,33679+00	,13369-01	,1534+00
7	,44358+03	,65534+02	,67667+01	,38412+01	,17689+00	,17123+03	,40144+00	,14364-01	,1583+00
8	,39364+03	,64808+02	,60739+01	,43153+01	,97777-01	,17134+03	,45315+00	,15324-01	,1605+00
9	,34354+03	,62958+02	,54566+01	,49626+01	,59194-01	,16971+03	,52862+00	,16662-01	,1728+00
10	,30481+03	,63246+02	,48195+01	,55183+01	,77750-01	,17334+03	,58650+00	,17707-01	,1589+00
11	,28434+03	,63813+02	,44559+01	,58887+01	,10060+00	,17460+03	,58079+00	,18739-01	,1524+00
12	,26503+03	,64406+02	,41150+01	,62577+01	,12451+00	,17592+03	,57490+00	,19841-01	,1456+00

AT LINE 39

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,66030+03	,70685+02	,93415+01	,00000	,14994+00	,17672+03	,15072-01	,99582-02	,1204+00
3	,64652+03	,69583+02	,92912+01	,87945+00	,18092+00	,17436+03	,90970-01	,10049-01	,1327+00
4	,60693+03	,68591+02	,88486+01	,17061+01	,15666+00	,17295+03	,17484+00	,10453-01	,1413+00
5	,55258+03	,67184+02	,82249+01	,23341+01	,14679+00	,17070+03	,24115+00	,10898-01	,1543+00
6	,50051+03	,66436+02	,75336+01	,30255+01	,15087+00	,17068+03	,31410+00	,11736-01	,1570+00
7	,44370+03	,65529+02	,67723+01	,35805+01	,16073+00	,17024+03	,37420+00	,12610-01	,1618+00
8	,39372+03	,64848+02	,60714+01	,40234+01	,87777-01	,17022+03	,42236+00	,13453-01	,1643+00
9	,34349+03	,63147+02	,54396+01	,46490+01	,52069-01	,16867+03	,49448+00	,14628-01	,1758+00
10	,30467+03	,63590+02	,47912+01	,51517+01	,67087-01	,17225+03	,54605+00	,15545-01	,1616+00
11	,28422+03	,64179+02	,44285+01	,55781+01	,85053-01	,17335+03	,53580+00	,16451-01	,1556+00
12	,26493+03	,64794+02	,40886+01	,60011+01	,10386+00	,17450+03	,52520+00	,17418-01	,1493+00

240

AT LINE 40

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,66123+03	,71037+02	,93082+01	,00000	,13917+00	,17760+03	,13956-01	,86079-02	,1160+00
3	,64746+03	,69949+02	,92561+01	,82594+00	,16693+00	,17523+03	,85151-01	,86864-02	,1283+00
4	,60713+03	,68946+02	,88058+01	,16007+01	,14583+00	,17366+03	,16360+00	,90359-02	,1375+00
5	,55304+03	,67613+02	,81794+01	,21881+01	,13480+00	,17144+03	,22532+00	,94201-02	,1501+00
6	,50084+03	,67004+02	,74748+01	,28341+01	,13636+00	,17154+03	,29296+00	,10145-01	,1519+00
7	,44388+03	,66238+02	,67013+01	,33543+01	,14546+00	,17123+03	,34866+00	,10900-01	,1557+00
8	,39371+03	,65753+02	,59878+01	,37713+01	,79693-01	,17150+03	,39316+00	,11628-01	,1565+00
9	,34340+03	,64283+02	,53420+01	,43815+01	,47081-01	,17031+03	,46189+00	,12644-01	,1660+00
10	,30449+03	,65225+02	,46683+01	,48285+01	,59803-01	,17472+03	,50533+00	,13437-01	,1469+00
11	,28406+03	,66004+02	,43037+01	,47068+01	,73997-01	,17609+03	,48971+00	,14220-01	,1393+00
12	,26478+03	,66817+02	,39627+01	,48788+01	,88933-01	,17753+03	,47350+00	,15056-01	,1313+00

AT LINE 41

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,66178+03	,69334+02	,95447+01	,00000	,12417+00	,17334+03	,12603-01	,72907-02	,1372+00
3	,64805+03	,68320+02	,94856+01	,75349+00	,14836+00	,17109+03	,78523-01	,73571-02	,1488+00
4	,60706+03	,67368+02	,90110+01	,14598+01	,13033+00	,16949+03	,15091+00	,76532-02	,1579+00
5	,55322+03	,66095+02	,83701+01	,19926+01	,11847+00	,16723+03	,20751+00	,79786-02	,1705+00
6	,50099+03	,65570+02	,76405+01	,25807+01	,11671+00	,16726+03	,26963+00	,85925-02	,1722+00
7	,44388+03	,64817+02	,68483+01	,30535+01	,12352+00	,16671+03	,32081+00	,92323-02	,1769+00
8	,39364+03	,64264+02	,61255+01	,34313+01	,64613-01	,16655+03	,36181+00	,98490-02	,1794+00
9	,34329+03	,62922+02	,54558+01	,40046+01	,34261-01	,16532+03	,42668+00	,10709-01	,1885+00
10	,30428+03	,63644+02	,47810+01	,43890+01	,43629-01	,16874+03	,46500+00	,11381-01	,1738+00
11	,28385+03	,64224+02	,44197+01	,42201+01	,54290-01	,16950+03	,44594+00	,12044-01	,1691+00
12	,26454+03	,64819+02	,40813+01	,40598+01	,65443-01	,17029+03	,42623+00	,12752-01	,1641+00

AT LINE 42

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,66190+03	,70745+02	,93561+01	,00000	,11676+00	,17687+03	,11733-01	,60049-02	,1197+00

3	,64022+03	,69710+02	,92989+01	,71131+00	,13753+00	,17454+03	,73336-01	,60596-02	,1317+00
4	,60659+03	,68719+02	,88271+01	,13767+01	,12311+00	,17275+03	,14092+00	,63035-02	,1415+00
5	,55308+03	,67547+02	,81880+01	,18775+01	,11114+00	,17064+03	,19341+00	,65715-02	,1532+00
6	,50080+03	,67232+02	,74489+01	,24299+01	,10758+00	,17104+03	,25070+00	,70771-02	,1529+00
7	,44363+03	,66729+02	,66483+01	,28769+01	,11304+00	,17097+03	,29788+00	,76041-02	,1549+00
8	,39342+03	,66559+02	,59108+01	,32377+01	,61661-01	,17164+03	,33547+00	,81120-02	,1531+00
9	,34308+03	,65532+02	,52353+01	,38009+01	,34159-01	,17105+03	,39683+00	,80205-02	,1589+00
10	,30405+03	,67073+02	,45331+01	,41316+01	,42211-01	,17622+03	,42638+00	,93739-02	,1350+00
11	,28364+03	,67984+02	,41721+01	,39191+01	,50661-01	,17764+03	,40175+00	,99200-02	,1268+00
12	,26433+03	,68926+02	,38350+01	,36949+01	,59580-01	,17914+03	,37619+00	,10503-01	,1181+00

AT LINE 43

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,66192+03	,64460+02	,10269+02	,00000	,94672-01	,16115+03	,99658-02	,47491-02	,1979+00
3	,64836+03	,63577+02	,10198+02	,61178+00	,11118+00	,15914+03	,65907-01	,47924-02	,2082+00
4	,60625+03	,62626+02	,96806+01	,11829+01	,99387-01	,15727+03	,12678+00	,49852-02	,2182+00
5	,55293+03	,61394+02	,90062+01	,16056+01	,87870-01	,15478+03	,17344+00	,51972-02	,2315+00
6	,50064+03	,61013+02	,82055+01	,20767+01	,81864-01	,15469+03	,22487+00	,55971-02	,2331+00
7	,44343+03	,60272+02	,73571+01	,24519+01	,84348-01	,15369+03	,26708+00	,60139-02	,2393+00
8	,39320+03	,59765+02	,65792+01	,27508+01	,40496-01	,15320+03	,30076+00	,64156-02	,2429+00
9	,34288+03	,58771+02	,58342+01	,32407+01	,15525-01	,15218+03	,35728+00	,69759-02	,2500+00
10	,30381+03	,59322+02	,51213+01	,34849+01	,19875-01	,15438+03	,38240+00	,74136-02	,2403+00
11	,28339+03	,59636+02	,47520+01	,32515+01	,25705-01	,15438+03	,35586+00	,78455-02	,2391+00
12	,26405+03	,59940+02	,44053+01	,30092+01	,31756-01	,15438+03	,32852+00	,83068-02	,2381+00

AT LINE 44

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,66114+03	,68309+02	,96787+01	,00000	,98403-01	,17078+03	,10062-01	,35220-02	,1500+00
3	,64759+03	,67323+02	,96192+01	,59409+00	,11228+00	,16849+03	,62277-01	,35541-02	,1616+00
4	,60501+03	,66338+02	,91201+01	,11482+01	,10434+00	,16651+03	,11963+00	,36971-02	,1722+00
5	,55212+03	,65329+02	,84514+01	,15599+01	,93332-01	,16454+03	,16340+00	,38543-02	,1828+00
6	,49975+03	,65156+02	,76700+01	,20124+01	,88636-01	,16492+03	,21091+00	,41508-02	,1820+00
7	,44251+03	,64757+02	,68334+01	,23781+01	,91599-01	,16472+03	,24994+00	,44599-02	,1841+00
8	,39258+03	,64753+02	,60627+01	,26739+01	,53898-01	,16546+03	,28089+00	,47578-02	,1815+00
9	,34239+03	,63971+02	,53523+01	,31623+01	,31904-01	,16493+03	,33422+00	,51734-02	,1862+00
10	,30346+03	,65559+02	,46288+01	,33519+01	,34771-01	,16952+03	,34989+00	,54980-02	,1643+00
11	,28312+03	,66355+02	,42667+01	,30571+01	,38666-01	,17056+03	,31721+00	,58183-02	,1577+00
12	,26381+03	,67156+02	,39283+01	,27470+01	,42763-01	,17166+03	,28334+00	,61604-02	,1509+00

AT LINE 45

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,66173+03	,50332+02	,13147+02	,00000	,61161-01	,12583+03	,72860-02	,23222-02	,3737+00
3	,64841+03	,49611+02	,13070+02	,42913+00	,69384-01	,12412+03	,52160-01	,23434-02	,3823+00
4	,60551+03	,48535+02	,12476+02	,82391+00	,62836-01	,12168+03	,10024+00	,24376-02	,3949+00
5	,55252+03	,47254+02	,11693+02	,11026+01	,55283-01	,11875+03	,13573+00	,25413-02	,4098+00
6	,50006+03	,46719+02	,10703+02	,14129+01	,49723-01	,11780+03	,17481+00	,27368-02	,4151+00
7	,44278+03	,45819+02	,96635+01	,16527+01	,49929-01	,11592+03	,20645+00	,29406-02	,4250+00
8	,39259+03	,45202+02	,86852+01	,18390+01	,25259-01	,11470+03	,23120+00	,31371-02	,4315+00
9	,34227+03	,44357+02	,77163+01	,21670+01	,90554-02	,11324+03	,27499+00	,34110-02	,4397+00
10	,30327+03	,44299+02	,68461+01	,22456+01	,94652-02	,11327+03	,28515+00	,36250-02	,4398+00
11	,28292+03	,44195+02	,64016+01	,20015+01	,11428-01	,11249+03	,25446+00	,38362-02	,4429+00
12	,26360+03	,44065+02	,59822+01	,17521+01	,13434-01	,11170+03	,22309+00	,40618-02	,4462+00

AT LINE 46

	P	T	RHO	U	V	E	M	Z	DHSTAG
2	,65805+03	,53662+02	,12263+02	,00000	,11136+00	,13416+03	,12848-01	,11486-02	,3323+00
3	,64451+03	,52949+02	,12172+02	,42180+00	,11995+00	,13247+03	,50933-01	,11590-02	,3408+00
4	,60152+03	,52201+02	,11523+02	,81429+00	,11504+00	,13084+03	,96198-01	,12057-02	,3492+00

5	,54950+03	,51176+02	,10737+02	,12905+01	,10352+00	,12854+03	,12942+00	,12569-02	,3611+00
6	,49710+03	,50657+02	,97745+01	,13885+01	,99992-01	,12811+03	,16499+00	,13537-02	,3637+00
7	,43994+03	,50261+02	,87532+01	,16220+01	,10163+00	,12697+03	,19374+00	,14544-02	,3699+00
8	,39084+03	,49647+02	,78724+01	,17914+01	,72322-01	,12572+03	,21505+00	,15516-02	,3765+00
9	,34107+03	,48939+02	,69694+01	,21090+01	,53891-01	,12457+03	,25487+00	,16871-02	,3831+00
10	,30250+03	,49801+02	,60742+01	,21255+01	,50173-01	,12676+03	,25462+00	,17930-02	,3723+00
11	,28234+03	,50274+02	,56160+01	,18296+01	,49323-01	,12736+03	,21816+00	,18974-02	,3685+00
12	,26314+03	,50731+02	,51871+01	,15203+01	,48435-01	,12798+03	,18048+00	,20090-02	,3646+00

AT LINE 47

	P	T	RHO	U	V	E	M	Z	CF	CH
2	,66424+03	,60000+01	,11071+03	,00000	,00000	,15000+02	,000000	,00000	,0000	,1487-01
3	,65130+03	,60000+01	,10855+03	,00000	,00000	,15000+02	,000000	,00000	,5842-03	,1451-01
4	,60750+03	,60000+01	,10125+03	,00000	,00000	,15000+02	,000000	,00000	,1084-02	,1373-01
5	,55431+03	,60000+01	,92384+02	,00000	,00000	,15000+02	,000000	,00000	,1393-02	,1288-01
6	,50126+03	,60000+01	,83544+02	,00000	,00000	,15000+02	,000000	,00000	,1647-02	,1187-01
7	,44371+03	,60000+01	,73951+02	,00000	,00000	,15000+02	,000000	,00000	,1790-02	,1090-01
8	,39288+03	,60000+01	,65481+02	,00000	,00000	,15000+02	,000000	,00000	,1853-02	,1008-01
9	,34207+03	,60000+01	,57012+02	,00000	,00000	,15000+02	,000000	,00000	,2007-02	,9119-02
10	,30304+03	,60000+01	,50507+02	,00000	,00000	,15000+02	,000000	,00000	,1903-02	,8753-02
11	,28274+03	,60000+01	,47124+02	,00000	,00000	,15000+02	,000000	,00000	,1548-02	,8360-02
12	,26363+03	,60000+01	,43936+02	,00000	,00000	,15000+02	,000000	,00000	,1215-02	,7977-02

STEP 450, TIME= ,3804-01, STANDOFF DISTANCE= ,1615+00
WMAX= -,3723+00, WMIN= -,5421+00, WRANGE= ,1698+00, MAXIM PRESS= ,6642+03

STEP 451, TIME= ,3810-01, STANDOFF DISTANCE= ,1612+00
WMAX= -,3607+00, WMIN= -,5388+00, WRANGE= ,1781+00, MAXIM PRESS= ,6641+03

STEP 452, TIME= ,3816-01, STANDOFF DISTANCE= ,1610+00
WMAX= -,3485+00, WMIN= -,5347+00, WRANGE= ,1862+00, MAXIM PRESS= ,6640+03

STEP 453, TIME= ,3822-01, STANDOFF DISTANCE= ,1608+00
WMAX= -,3357+00, WMIN= -,5298+00, WRANGE= ,1941+00, MAXIM PRESS= ,6638+03

STEP 454, TIME= ,3828-01, STANDOFF DISTANCE= ,1606+00
WMAX= -,3222+00, WMIN= -,5242+00, WRANGE= ,2019+00, MAXIM PRESS= ,6636+03

STEP 455, TIME= ,3834-01, STANDOFF DISTANCE= ,1603+00
WMAX= -,3080+00, WMIN= -,5177+00, WRANGE= ,2097+00, MAXIM PRESS= ,6633+03

ROUTINE TERMINATED AT MERR$
OPERATOR KILLED RUN AT 022607

B	030000	000000	000000	000006	000000	025550	000156	002300	004230	006760	000000	000060	000001	000060	000000	000000
	000000	000000	000000	171441	000000	153772	000000	024376	411105	720611	155027	231174	400000	000176	204442	417127
A	411105	720611	155027	231174	400000	000176	204442	417127	204442	750425	155213	255364	000000	000002	000041	141716
	000001	400000	622777	777777	602076	546330	635671	505577	000000	000000	000000	000000	000000	000012	000000	000004
R	000000	000664	000000	075035	263374	150643	000104	065300	000000	000177	777777	777776	000000	032042	000000	000001
	000000	000206	000000	000000	000000	000000	777777	777776	777777	777776	777777	777776	000000	000002	000000	000051

REMAINING CONTROL CARDS IGNORED

III. Reacting thin-shock code

```
PROC* FCOPY
      REAL NU,LEWIS
      PARAMETER NN=40,MM=20,JJ=11
      COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
      COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DT1,
     1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME
     2,LEWIS
      COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
      COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
      COMMON/MAIN5/BETA,SQEZ(NN)
      COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
      COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
      COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
      COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
      COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
      COMMON/HEAT1/Q1,Q2
      COMMON/DIFU1/D1(JJ),D2(JJ)
      COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
     1               H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
      COMMON/TRAN1/AP1,AP2,AP3(10,10)
      END
C
C
```

```
C
C              2D VISCOUS SHOCK LAYER CALCULATION USING CONSERVATIVE
C              EQUATIONS IN THE CURVILINEAR COORDINATE SYSTEM
C                WITH CHEMICAL REACTIONS
C
      INCLUDE PROC,LIST
      REAL NUBAR
      DIMENSION ZA(20),NUBAR(NN)
C
  100 FORMAT(14I5)
  101 FORMAT(7E10.4)
  102 FORMAT(//46X,11HRUN NUMBER I4,4H ON I2,1H/,I2,1H/,I2/45X,3HLB=I3,
     1       5X,3HLE=I3)
  103 FORMAT(1H0,40X,6HGAMMA=E15.7,7X,5HSTAB=E15.7)
  104 FORMAT(12A6)
  105 FORMAT(1H023X12A6)
  106 FORMAT(1H1,25X,62H REACTING VISCOUS SHOCK LAYER SOLUTION AT ZERO
     1FLOW INCIDENCE / 53X,13H PROGRAM G132)
  107 FORMAT(/30X,3HMA=I3,5X,3HNA=,I3,5X,3HKA=I6,5X,3HJA=I6,5X,
     1        5HBETA=F5.2)
  108 FORMAT(1H0,11H EPS 1 TO 7/7E15.6,1H1)
  109 FORMAT(/26X,3HRE=E10.5,7X,3HPR=E10.5,7X,6HLEWIS=,E10.5,7X,3HTW=
     1        E10.5)
  110 FORMAT(1H0,4HUO=,E8.4,7X,4HPIN=,E8.4,7X,4HHIN=,E8.4,7X,4HRIN=,E8.4
     1       ,7X,4HTIN=,E8.4,7X,4HEIN=,E8.4,7X,4HACH=,E8.4)
  120 FORMAT(///,15X,4H ZO=E12.4,10X,4HYO= ,E10.4,10X, 6HXIMAX=,E10.4,
     1      10X,6HANGLE=E10.5)
C
C     JC IS THE NUMBER OF DEPENDENT VARIBLES
C     MA IS THE NUMBER OF INTERVALS IN THE XI OR STREAMWISE DIRECTION
C     NA IS THE NUMBER OF INTERVALS IN THE NU OR CROSSSTREAM DIRECTION
C     KA IS THE NUMBER OF TIME STEPS
C     JA IS THE NUMBER OF TIME STEPS FOR OUTPUT
C     LB=0 IS PLANAR FLOW.
C     LB=1 IS AXISYMMETRIC FLOW
C     LE=1 IS ELLIPSOID
C     LE=2 IS PARABOLOID
C     LE=3 IS HYPERBOLID
C     EPS(1) IS TOLERANCE IN SHOCK CALCULATION
C     HIN (FEET/SECOND)**2.
C     PIN LB/FEET**2.
C     UO  FEET/SECOND
C     RIN SLUGS/FEET**3.
C     TIN RANKINE
C     GAMMA CP/CV
C     STAB =1.
C     ELL   HORIZONTAL/VERTICAL AXIS
C     ZO AND YO ARE THE LOCATION OF BODY ORIGIN
C
    5 WRITE(6,106)
      READ (5,104)(ZA(I),I=1,12)
      WRITE(6,105)(ZA(I),I=1,12)
      READ(5,100) NRUN,MONTH,NDAY,MYEAR,LB,LE,JC
      READ (5,100) MA,NA,KA,JA
      READ (5,101)(EPS(M),M=1,3)
      READ(5,101) RE,PR,LEWIS,TW,BETA
      READ (5,101) UO,PIN,HIN,GAMMA
      READ (5,101) STAB,ELL,ZO,YO,XIMAX,ANGLE
   11 WRITE(6,102)NRUN,MONTH,NDAY,MYEAR,LB,LE
      WRITE(6,107)MA,NA,KA,JA,BETA
```

```
      WRITE(6,103)GAMMA,STAB
      WRITE(6,109) RE,PR,LEWIS,TW
      WRITE(6,120)ZO,YO,XIMAX,ANGLE
      GA=GAMMA/(GAMMA-1.)
      GB=1./(GAMMA-1.)
      GC=(GAMMA+1.)/(GAMMA-1.)
      GD=(GAMMA-1.)/2.
      GE=(GAMMA+1.)/2.
      CALL ACHEM(8,PIN,HIN,RIN)
      CALL ACHEM(9,PIN,HIN,TIN)
      CALL ACHEM(10,PIN,HIN,AIN)
      CALL ACHEM(11,PIN,HIN,EIN)
      ACH=UO/AIN
      ANGLE=ANGLE*0.01745329252
C
      WRITE(6,110)UO,PIN,HIN,RIN,TIN,EIN,ACH
      WRITE(6,108)(EPS(M),M=1,3)
C
      TIME=0.
      K=0
      J=0
      M1=0
      N1=0
      DT=0.
C
      SMIN=ACH**2.
      DXI=XIMAX/FLOAT(MA)
      DNU=1./FLOAT(NA)
      MC=MA+2
      NC=NA+2
C
      DO 1 M=2,MC
    1 XI(M)=DXI*FLOAT(M-2)
      XI(1)=-XI(3)
C
      MCM=MC-1
      NCM=NC-1
C
      DO 2 N=2,NC
      NUBAR(N)=DNU*FLOAT(N-2)
      NU(N)=ALOG(1.-(1.-EXP(BETA))*NUBAR(N))/BETA
      SQEZ(N)=-BETA*EXP(BETA*NU(N))/(1.-EXP(BETA))
      IF(BETA.LE.0)NU(N)=NUBAR(N)
      IF(BETA.LE.0)SQEZ(N)=1.
    2 CONTINUE
C
C
      CALL INPUTT
      CALL INPUTR
      CALL VISFLO
      K=0
      GO TO 5
C
      END
C
C
```

```
      SUBROUTINE INPUTT
C                                                                       INPT   4
      INTEGER SUB,SPECIE,SPECE                                          INPT   6
      INTEGER DAT,BLANK,FROZEN,SIMPLE,ISOTHE,CATALY
      LOGICAL FROZN,SIMPL,ISOTH,CATAL
      DIMENSION NAM(3),DAT(12)
      COMMON/CONTRL/FROZN,SIMPL,ISOTH,CATAL
      COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/INPUT2/TEM(20,20),TABLES(20,20,3),SPECIE(20,2,3),ROTNM(10),
     1STC(10,10),SPECE(2,3),NTT(20),NTAB(20)
      COMMON/INPUT3/TLOW,TMID,THIGH
      DATA ND/4HLAST/,END/3HEND/,BLANK/1H /,FROZEN/6HFROZEN/
      DATA SIMPLE/6HSIMPLE/,ISOTHE/6HISOTHE/,CATALY/6HCATALY/
      DATA NR/3/
C                                                                       INPT  49
C
      READ(5,204)(DAT(I),I=1,4)
  204 FORMAT(6(A6,6X))
      IF(DAT(1).EQ.FROZEN)FROZN=.TRUE.
      IF(DAT(1).EQ.BLANK)FROZN=.FALSE.
      IF(DAT(2).EQ.SIMPLE)SIMPL=.TRUE.
      IF(DAT(2).EQ.BLANK)SIMPL=.FALSE.
      IF(DAT(3).EQ.ISOTHE)ISOTH=.TRUE.
      IF(DAT(3).EQ.BLANK)ISOTH=.FALSE.
      IF(DAT(4).EQ.CATALY)CATAL=.TRUE.
      IF(DAT(4).EQ.BLANK)CATAL=.FALSE.
      WRITE(6,112)(DAT(I),I=1,4)
  112 FORMAT(////,20X,6(A6,6X))
C
C     READ IN THERMODYNAMIC COEFFICIENTS
      READ(5,115)TLOW,TMID,THIGH
      WRITE(6,116)TLOW,TMID,THIGH
  116 FORMAT(1H1,3F10.3)
  115 FORMAT(3F10.3)
      NS=1
  117 READ(5,110)(NAM(I),I=1,3),WM,FRAC,HOO
      WRITE(6,111)(NAM(I),I=1,3),WM,FRAC,HOO
  110 FORMAT(3A4,8X,3E10.4)
  111 FORMAT(1X,3A4,8X,3E10.4)
      IF(NAM(1).EQ.ND)GO TO 171
      READ(5,200)((COEF(I,J,NS),J=1,7),I=1,2)
      WRITE(6,200)((COEF(I,J,NS),J=1,7),I=1,2)
  200 FORMAT(5E15.8)
      WMOL(NS)=WM
      XS(NS)=FRAC
      HO(NS)=HOO
      DO 829 I=1,3
  829 SUB(NS,I)=NAM(I)
      NS=NS+1
      GO TO 117
C
C
  171 CONTINUE
      WRITE(6,116)
C                                                                       TRAN  78
C     READ TRANSPORT CROSSSECTION DATA FROM CARDS
      NK=1                                                              TRAN  79
   13 CONTINUE                                                          TRAN  80
      READ(5,14) ((SPECE(I,L),L=1,3),I=1,2),NTP,NTB,ROTN
```

```
      WRITE(6,114) ((SPECE(I,L),L=1,3),I=1,2),NTP,NTB,ROTN
   14 FORMAT(2(3A4,6X),2I5,F24.1)
  114 FORMAT(1X,2(3A4,6X),2I5,F24.1)
      IF(SPECE(1,1).EQ.ND) GO TO 10                                    TRAN  83
      K=1                                                              TRAN  84
      DO 5 J=1,NS                                                      TRAN  85
    2 DO 4 I=1,3                                                       TRAN  90
    4 IF(SPECE(K,I).NE.SUB(J,I)) GO TO 5                               TRAN  91
      GO TO 6                                                          TRAN  92
    5 CONTINUE                                                         TRAN  93
      READ(5,15)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)             TRAN  94
      WRITE(6,155)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)
      GO TO 13                                                         TRAN  95
    6 K=2                                                              TRAN  96
      DO 8 JJ=1,NS                                                     TRAN  97
      DO 7 II=1,3                                                      TRAN  98
    7 IF(SPECE(K,II).NE.SUB(JJ,II)) GO TO 8                            TRAN  99
      GO TO 10
    8 CONTINUE                                                         TRAN 101
      READ(5,15)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)             TRAN 102
      WRITE(6,15)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)
      GO TO 13                                                         TRAN 103
   10 DO 12 L=1,3                                                      TRAN 104
      DO 12 I=1,2                                                      TRAN 105
   12 SPECIE(NK,I,L)=SPECE(I,L)                                        TRAN 106
      IF(SPECIE(NK,1,1).EQ.ND) GO TO 17                                TRAN 107
      NTT(NK)=NTP                                                      TRAN 108
      NTAB(NK)=NTB                                                     TRAN 109
      ROTNM(NK)=ROTN                                                   TRAN 110
      READ(5,15)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)
      WRITE(6,155)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)
   15 FORMAT(4F10.4)                                                   TRAN 112
  155 FORMAT(1X,4F10.4)
      NK=NK+1                                                          TRAN 113
      IF(NK.GT.50) GO TO 17
      GO TO 13                                                         TRAN 115
   17 CONTINUE                                                         TRAN 116
      WRITE(6,18)                                                      TRAN 119
   18 FORMAT(1H0,40X,50HTABLES OF TRANSPORT AND RELAXATION DATA ARE FILLTRAN 120
     1ED)                                                              TRAN 121
C
C     READ IN STOICHIOTS COEFFICIENTS
      NM=NS-1
      READ(5,400)((STC(I,J),J=1,NM),I=1,NR)
  400 FORMAT( 5F5.0)
      WRITE(6,401)((STC(I,J),J=1,NM),I=1,NR)
  401 FORMAT(1X,5F5.0)
      CALL SORT
      RETURN
      END
C
C
```

```
      SUBROUTINE INPUTR
      DIMENSION ZQ(6,20)
      DIMENSION CLOW(10,7),CHIGH(10,7)
      DIMENSION HZERO(10),ANAME(10),ATWT(10)
      DIMENSION Z(12),PP(10,6)
      COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/INPUR1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
     1FRACT(10),IPR(20,6)
      EQUIVALENCE (CHIGH(1,1),COEF(1,1,1)),(CLOW(1,1),COEF(2,1,1)),
     1        (HZERO,HO),(ANAME,SUB(1,1)),(ATWT,WMOL)
   11 FORMAT(12A6)
   12 FORMAT(1H1,23X,12A6,///)
   13 FORMAT(91X,1HN ,/,72X,19HK = A *EXP(-B/T)*T,/,72X,21H(UNITS - CC/M
     1OLE/SEC),//,17X,19HREACTIONS CONSDERED,30X,1HA,15X,1HB,15X,1HN,
     2 20X,8HREACTION,/,120X,4HTYPE,)
   14 FORMAT(1HO,I2,5X,A6,1H+,A6,1H+,A6,3H = ,A6,1H+,A6,1H+,A6,10X,
     1 3E15.5,20X,I2)
   15 FORMAT(6A6)
   16 FORMAT(///1X,7HSPECIES,5X,10HINIT. MOLE,5X,8HMOL. WT.,30X,      47
     1HTEMPERATURE COEFFICIENTS(0-8000 DEGREES KELVIN),/,13X,8HFRACTION,
     2 25X,6HB(I,1),6X,6HB(I,2),6X,6HB(I,3),6X,6HB(I,4),6X,6HB(I,5),6X,
     3 6HB(I,6),6X,6HB(I,7) )
   17 FORMAT(1H ,I2,2X,A6,1X,E8.3,2X,F9.5,2X,7E13.7)
   18 FORMAT(20X,10F10.2)
   30 FORMAT(////,65X,50HTEMPERATURE COEFFICIENTS(8000-30000DEGREES KELV
     1IN),/,46X,6HA(I,1),6X,6HA(I,2),6X,6HA(I,3),6X,6HA(I,4),6X,
     2 6HA(I,5),6X,6HA(I,6),6X,6HA(I,7)  )
   40 FORMAT(1H ,30X,7E13.7)
  100 FORMAT(2I2)
  300 FORMAT(A6,4X,2F10.5,F10.2)
  308 FORMAT(6I1)
  500 FORMAT(I1,8X,E10.5,2F10.5)
  700 FORMAT(////,30X,14HREACTION TYPES,30X,26HPRODUCT - REACTANT MATRIX
     1 )
  800 FORMAT(20X,6A6,20X,6I4)
  900 FORMAT(4E20.10,/,3E20.10)
      READ(5,100) NSPEC,NREACT
      NS = NSPEC
      READ(5,11) ( Z(I),I=1,12 )
      WRITE(6,12) ( Z(I),I=1,12 )
      WRITE(6,13)
      DO 201 JJ=1,NREACT
      READ(5,15) (ZQ(I,JJ), I=1,6)
      READ(5,500)ITYPE(JJ),COEFA(JJ),COEFB(JJ),ETA(JJ)
      WRITE(6,14)JJ,(ZQ(LL,JJ),LL=1,6),COEFA(JJ),COEFB(JJ),ETA(JJ),
     1 ITYPE(JJ)
  201 CONTINUE
      WRITE(6,16)
      DO 202 MM=1,NSPEC
      FRACT(MM)=XS(MM)
  202 WRITE(6,17) MM,ANAME(MM),FRACT(MM),ATWT(MM),(COEF(2,NN,MM),NN=1,7)
      WRITE(6,30)
      DO 50  JDUM=1,NSPEC
      WRITE(6,40) (COEF(1,IJ,JDUM),IJ=1,7)
   50 CONTINUE
      WRITE (6,700)
  501 FORMAT(6A6)
      DO 31 JREACT=1,NREACT
      DO 41 I=1,6
```

```
      DO 41 J=1,NSPEC
      IF( ZQ(I,JREACT) .EQ. ANAME(J)) IPR(JREACT,I)=J
   41 CONTINUE
   31 CONTINUE
      DO 205 IDUM=1,7
  205 READ(5,15)  (PP(IDUM,JDUM), JDUM=1,6)
      INDEX= MAXO(NREACT,5)
      DO 206 IIDUM=1,INDEX
      IF(IIDUM.GT.7)WRITE(6,800)(PP(7,JJDUM),JJDUM=1,6),
     1  (IPR(IIDUM,KDUM),KDUM=1,6)
  206 IF(IIDUM.LE.7)WRITE(6,800)(PP(IIDUM,JJDUM),JJDUM=1,6),
     1  (IPR(IIDUM,KDUM),KDUM=1,6)
      DO 207 I=1,NSPEC
  207 WRITE(6,18) (HZERO(I))
      RETURN
      END
C
C
```

```
      SUBROUTINE VISFLO
C
      INCLUDE PROC,LIST
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
      COMMON/DISS1/WWW(10),DT
C
  150 FORMAT(1HO,4HSTEP,I4,7H, TIME=  E11.4,20H, STANDOFF DISTANCE=  E11
     1       .4/9X,5HWMAX=  E11.4,7H, WMIN=  E11.4,9H, WRANGE=  E11.4,14
     2       H, MAXIM PRESS=  E11.4)
C
C
C     ********************************************************************
      CALL BODY
      CALL INIT
      CALL OUTPUT
C     ********************************************************************
C
C
C     START TIME-DEPENDENT CALCULATION
    8 K=K+1
      L=L+1
C
C     DETERMINE STEP SIZE
C
      DTT=DT
      N1=0
      M1=0
      DAM=S(2)*(NU(NC)-NU(NCM))
      DEM=DXI
      DS=AMIN1(DAM,DEM)
      DT=STAB*DS/1.5/(SQRT((U(NC,2,2)/U(NC,2,1))**2.+(U(NC,2,3)/U(NC,2,1
     1       ))**2.)+A(NC,2))
      DO 34 M=2,MCM
      DO 34 N=2,NCM
      DAM=S(M)*(NU(N+1)-NU(N))
      DS=AMIN1(DAM,DEM)
      DT1=STAB*DS/1.5/(SQRT((U(N,M,2)/U(N,M,1))**2.+(U(N,M,3)/U(N,M,1))
     1       **2.)+A(N,M))
      DT2=DS**2./8./(SQRT(GAMMA)*ACH/RE)
      IF(RE.LT.0.1)DT2=1.0
      DT1=AMIN1(DT1,DT2)
      IF(DT1-DT)35,34,34
   35 DT=DT1
      N1=N
      M1=M
   34 CONTINUE
      IF(DT.LT.0.) CALL EXIT
      DT1=DT
      DT2=DTT/3.
      IF(DT2.GT.DT1)DT2=DT1
      IF(K.EQ.1)DT2=0.001*DT
C
C     INTERMEDIATE OUTPUT
C
   20 KM=K-1
      DAM=ST(2)
      DOM=DAM
      DO 22 M=3,MC
      DAM=AMAX1(ST(M),DAM)
   22 DOM=AMIN1(ST(M),DOM)
```

```
      RANGE=ABS(DAM-DOM)
      DIM=S(2)
      DUM=P(NC,2)
      DO 221 M=3,MC
      DOM1=P(NC,M)
      DEM1=S(M)
      DIM=AMIN1(DIM,DEM1)
  221 DUM=AMAX1(DUM,DOM1)
      TIME=TIME+DT1
      WRITE(6,150)KM,TIME,DIM,DAM,DOM,RANGE,DUM
      WRITE(6,160)DT1,DT2
  160 FORMAT(  )
C
C
C
C     ******************************************************************
      CALL DIFF
C     ******************************************************************
C
C
C
      IF(K.GE.KA) GO TO 17
      IF(L.LT.JA) GO TO 15
C     ******************************************************************
   16 CALL OUTPUT
C     ******************************************************************
      L=0
   15 GO TO 8
C
   17 CALL OUTPUT
      RETURN
      END
C
C
```

```
      SUBROUTINE BODY
C     LIMITED TO ANALYTIC BODY SHAPE
      INCLUDE PROC,LIST
      DIMENSION ZBY(MM),ZBYY(MM)
C
  100 FORMAT(2I3,2F12.6)
  200 FORMAT(1H1,20X,2HM=,10X,3HXI=,10X,3HZB=,10X,3HYB=,10X,4HZBY=,10X
     1       ,5HCURV=)
  500 FORMAT(20X,I2,5X,F8.4,12X,F6.3,6X,F9.5,5X,F9.5,5X,F6.3,6X,F9.5,5X
     1       ,F9.5)
C
      IF(LE.NE.0) GO TO 11
      CALL EXIT
   11 CONTINUE
C
      PHI(2)=1.57079633
      ZB(2)=Z0+1./ELL
      TANE=SIN(ANGLE)/COS(ANGLE)
      DO 1 M=2,MC
      YB(M)=YB(M-1)+DXI*SIN(PHI(M-1))
      YB(2)=0.
C
      GO TO (12,13,14),LE
C     ELLIPSOID AND CONE
   12 ZBAR= Z0+TANE/(ELL*SQRT(ELL**2.+TANE**2.))
      YBAR=ELL/SQRT(ELL**2.+TANE**2.)
      AA=YBAR+ZBAR*TANE
      IF(YB(M).LE.YBAR)ZB(M)=Z0+SQRT(1.-YB(M)**2.)/ELL
      IF(YB(M).LE.YBAR)ZBY(M)=-YB(M)/ELL**2./(ZB(M)-Z0)
      IF(YB(M).LE.YBAR)ZBYY(M)=-(1.+ELL**2.*ZBY(M)**2.)/ELL**2./
     1         (ZB(M)-Z0)
      IF(YB(M).GE.YBAR)ZB(M)=-(YB(M)-AA)/TANE
      IF(YB(M).GE.YBAR)ZBY(M)=-1./TANE
      IF(YB(M).GE.YBAR)ZBYY(M)=0.
      GO TO 15
   13
C     PARBOLOID AND CONE
      GO TO 15
   14
C     HYPERBOLOID
      ELL=TANE
      AA=1./ELL**2.
      YMAX=XIMAX
      ZMAX=SQRT((YMAX/ELL)**2.+AA**2.)
      ZB(2)=ZMAX-SQRT((YB(2)/ELL)**2.+AA**2.)
      ZB(M)=ZMAX-SQRT((YB(M)/ELL)**2.+AA**2.)
      ZBY(M)=-YB(M)/ELL**2./(ZMAX-ZB(M))
      ZBYY(M)=(-1.+(ELL*ZBY(M))**2.)/ELL**2./(ZMAX-ZB(M))
      GO TO 15
   15 CONTINUE
      BXI(M)=0.
      PHI(M)=PHI(2)-ATAN(ABS(ZBY(M)))
      CURV(M)=ZBYY(M)/(1.+ZBY(M)**2.)**1.5
C     POSITIVE CURVATURE FOR CONVEX BODY IN THE Y DIRECTIONS
      CURV(M)=ABS(CURV(M))
C
    1 CONTINUE
C
      BXI(1)=-BXI(3)
      CURV(1)=CURV(3)
```

```
      PHI(1)=PHI(3)
      YB(1)=YB(3)
      ZB(1)=ZB(3)
C
      WRITE(6,200)
      DO 20 M=2,MC
      YY=DXI*FLOAT(M-2)
   20 WRITE(6,500)M,YY,ZB(M),YB(M),PHI(M),CURV(M)
C
      DO 30 N=2,NC
   30 WRITE(6,500)N,SQEZ(N)
C
      RETURN
      END
C
C
```

```
      SUBROUTINE INIT
C
      INCLUDE PROC,LIST
      DIMENSION R(NN,MM),U(NN,MM),V(NN,MM),E(NN,MM),C(NN,MM,7)
      COMMON/INPUR1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
     1FRACT(10),IPR(20,6),Z(12),ZZ(6),PP(10,6)
      COMMON/DIFF1/Q(NN,MM,JJ),UN(NN,MM,JJ)
      EQUIVALENCE (UN(1,1,1),R(1,1)),(UN(1,1,2),U(1,1)),(UN(1,1,3),V(
     1              1,1)),(UN(1,1,4),E(1,1)),(UN(1,1,5),C(1,1,1))
C
  100 FORMAT(1H0,22H STAGNATION PRESSURE =E15.7)
C
C
C     DEFINE SHOCK GEOMETRY
      S(2)=.15*ACH/(ACH-1.)**1.1
C
      DO 1 M=2,MC
      S(M)=S(2)*(1.+(M-2)/2./MC)
      YS(M)=YB(M)+S(M)*COS(PHI(M))
    1 ZS(M)=ZB(M)+S(M)*SIN(PHI(M))
      S(1)=S(3)
C
      DO 6 M=3,MCM
    6 SXI(M)=(S(M+1)-S(M-1))/2./DXI
      SXI(MC)=(S(MC)-S(MCM))/DXI
      SXI(1)=-SXI(3)
      SXI(2)=0.
C
      DO 21 M=3,MCM
      AL=(YS(M+1)-YS(M))/(YS(M)-YS(M-1))
   21 ZSY(M)=(ZS(M+1)+(AL*AL-1.)*ZS(M)-AL*AL*ZS(M-1))/(AL+1.)/
     1         (YS(M+1)-YS(M))
      ZSY(2)=0.
      ZSY(MC)=2.*ZSY(MCM)-ZSY(MCM-1)
C
      DO 7 M=2,MC
      THE=ATAN(ABS(ZSY(M)))
      THE=1.5708-THE
      VND=U0*SIN(THE)
      CALL ANKINR(VND,VCART,RS,PS,AB,TS)
      HS=HIN/PIN*RIN+.5*(1.+1./RS)*(PS-1.)
      E(2,M)=HS-PS/RS
      A(2,M)=AB
      PSI(M)=THE-PHI(M)
      R(2,M)=ALOG(RS)
      P(2,M)=ALOG(PS)
      T(2,M)=TS
      UIN=U0*COS(THE)/SQRT(PIN/RIN)
      US=UIN
      VS=VCART
      U(2,M)=US*COS(PSI(M))+VS*SIN(PSI(M))
      V(2,M)=US*SIN(PSI(M))-VS*COS(PSI(M))
      ST(M)=0.
      SMS=(U(2,M)**2.+V(2,M)**2.)/AB**2.
      IF(S(M).GT.0.AND.SMS.LT.ACH**2.) GO TO 7
      WRITE(6,154)
  154 FORMAT(34H MACH NUMBER BEHIND SHOCK TOO HIGH)
    7 CONTINUE
C
C     DEFINE THE STAGNATION POINT
```

```
C
      AC=-V(2,2)/A(2,2)
      PST=EXP(P(2,2))*(1.+GD*(AC**2.1)**GA
      SMS=AC**2.
      PDST=PST*PIN
      HDST=HIN+U0**2./2.
      HST=HDST/PIN*RIN
      IF(RE.LE.1.E8)HST=0.5*HST
      CALL ACHEM(8,PDST,HDST,RDST)
      RST=RDST/RIN
      CALL ACHEM(9,PDST,HDST,TST)
      T(NC,2)=TST/TIN
      EST=HST-PST/RST
      U(NC,2)=0.
      V(NC,2)=0.
      P(NC,2)=ALOG(PST)
      R(NC,2)=ALOG(RST)
      E(NC,2)=EST
      CALL ACHEM(10,PDST,HDST,AST)
      A(NC,2)=AST/SQRT(PIN/RIN)
C
      LD=3*MC/4
C
      XIBAR=XI(LD)
C
C     DEFINE VALUE ON THE BODY
C
      DO 2 M=2,MC
      IF(M.GT.LD) GO TO 205
      SMS=(XI(M)/XIBAR)**2.
      GO TO 208
  205 SMS=(1.+XI(M)/XIBAR)**2./3.
  208 DUM=1.+GD*SMS
      PB=PST/DUM**GA
      PBD=PB*PIN
      HB=(1.-(M-2)/8./(MCM-1))*HST
      HBD=HB*PIN/RIN
      CALL ACHEM(10,PBD,HBD,AD)
      AQ=AD/SQRT(PIN/RIN)
      CALL ACHEM(8,PBD,HBD,RBD)
      RB=RBD/RIN
      R(NC,M)=ALOG(RB)
      CALL ACHEM(9,PBD,HBD,TBD)
      T(NC,M)=TBD/TIN
      A(NC,M)=AQ
      P(NC,M)=ALOG(PB)
      E(NC,M)=HB-PB/RB
      U(NC,M)=AQ*SQRT(SMS)
      V(NC,M)=0.
    2 CONTINUE
C
C     INTERPOLATE VALUES BETWEEN SHOCK AND BODY
C
      DO 3 M=2,MC
      DP=(P(NC,M)-P(2,M))*DNU
      DR=(R(NC,M)-R(2,M))*DNU
      DT=(T(NC,M)-T(2,M))*DNU
      DE=(E(NC,M)-E(2,M))*DNU
      DA=(A(NC,M)-A(2,M))*DNU
      DU=(U(NC,M)-U(2,M))*DNU
```

```
      DV=(V(NC,M)-V(2,M))*DNU
C
      DO 3 N=2,NC
      P(N,M)=P(2,M)+DP*FLOAT(N-2)
      R(N,M)=R(2,M)+DR*FLOAT(N-2)
      T(N,M)=T(2,M)+DT*FLOAT(N-2)
      E(N,M)=E(2,M)+DE*FLOAT(N-2)
      A(N,M)=A(2,M)+DA*FLOAT(N-2)
      U(N,M)=U(2,M)+DU*FLOAT(N-2)
      V(N,M)=V(2,M)+DV*FLOAT(N-2)
    3 CONTINUE
C
      DO 5 M=2,MC
      IF(RE.GT.1.E8) GO TO 5
      U(NC,M)=0.
      R(NC,M)=R(NC,M)+ALOG(T(NC,M)/TW)
      T(NC,M)=TW
      E(NC,M)=TW*EIN/PIN*RIN
    5 CONTINUE
C
      DO 4 N=2,NC
      P(N,1)=P(N,3)
      R(N,1)=R(N,3)
      T(N,1)=T(N,3)
      A(N,1)=A(N,3)
      E(N,1)=E(N,3)
      U(N,1)=-U(N,3)
      V(N,1)=V(N,3)
    4 CONTINUE
C
      DO 8 J=5,JC
      DO 8 N=2,NC
      DO 8 M=1,MC
    8 C(N,M,J-4)=FRACT(J-4)
C
      CALL CONVR1
C
      RETURN
      END
C
C
```

```
      SUBROUTINE ANKINR(UN,UCART,RS,PS,AS,TS)
      INCLUDE PROC,LIST
C
      UNIN=UN/SQRT(PIN/RIN)
      AMIN=UNIN**2./(AIN**2./(PIN/RIN))
      KIM=1
      RORIN=GE*AMIN/(1.+GD*AMIN)
  404 PS=1.+(1.-1./RORIN)*UNIN**2.
      PSD=PS*PIN
      HS=HIN/PIN*RIN+.5*(1.+1./RORIN)*(PS-1.)
      HSD=HS*PIN/RIN
      CALL ACHEM(8,PSD,HSD,RSD)
      IF(ABS(RSD-RORIN*RIN)/RSD-.0001)402,402,403
  403 KIM=KIM+1
      IF(KIM-20)406,406,405
  406 RORIN=RSD/RIN
      GO TO 404
  405 WRITE(6,407)
  407 FORMAT(///27HERROR IN MAIN SHOCK DENSITY)
      CALL EXIT
  402 CONTINUE
      CALL ACHEM(9,PSD,HSD,TSD)
      TS=TSD/TIN
      CALL ACHEM(10,PSD,HSD,AD)
      AS=AD/SQRT(PIN/RIN)
      RS=RORIN
      UCART=UNIN/RS
C
      RETURN
      END
C
C
```

```
      SUBROUTINE ACHEM(N,X,Y,STOR)
      INCLUDE PROC,LIST
C
      XX=X                                                          092S2309
      YY=Y                                                          092S2310
      XX=ABS(XX)
      YY=ABS(YY)
      IF(N) 12,10,11
   10 RETURN                                                        092S2312
   11 IF(N-20)13,13,12
   12 WRITE(6,9)N
    9 FORMAT(//1H041X33HCODE FOR AIR CHEMISTRY INCORRECT=I4)        092S2315
      CALL EXIT                                                     092S2316
   13 R=3089.67/1.8
      L=((N-2)/5+1)
      GO TO (100,200),L
  100 GO TO(12,101,102,104,103),N
  101 POPIN=XX/PIN                                                  092S2321
      RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                             092S2322
      STOR=GA*XX/(RORIN*RIN)                                        092S2323
      GO TO 10                                                      092S2324
  102 POPIN=XX/PIN                                                  092S2325
      RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)
      STOR=RORIN*RIN                                                092S2327
      GO TO 10                                                      092S2328
  103 POPIN=XX/PIN                                                  092S2329
      RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                             092S2330
      STOR=SQRT(GAMMA*XX/(RORIN*RIN))                               092S2331
      GO TO 10                                                      092S2332
  104 POPIN=XX/PIN
      RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                             092S2326
      RR=RORIN*RIN
      STOR=XX/RR/R
      GO TO 10
  200 NNN=N-5
      GO TO(12,201,202,204,203,205),NNN
  204 STOR=YY/GA/R                                                  092S2335
      GO TO 10                                                      092S2336
  201 RR=GA*XX/YY                                                   092S2337
      RORIN=RR/RIN                                                  092S2338
      POPIN=XX/PIN                                                  092S2339
      STOR=ALOG(POPIN)-GAMMA*ALOG(RORIN)                            092S2340
      GO TO 10                                                      092S2341
  202 STOR=GA*XX/YY                                                 092S2342
      GO TO 10                                                      092S2343
  203 RR=GA*XX/YY                                                   092S2344
      STOR=SQRT(GAMMA*XX/RR)                                        092S2345
      GO TO 10                                                      092S2346
  205 STOR=YY/GAMMA
      GO TO 10
      END
```

```
      SUBROUTINE ACHEM(N,X,Y, STOR)
      XX=X                                                          092S1279
      YY=Y                                                          092S1280
      NN=N                                                          092S1281
      IF(NN)12,12,11                                                092S1282
   12 WRITE(6,19)NN
   19 FORMAT(//1H041X33HCODE FOR AIR CHEMISTRY INCORRECT=I4)
      CALL EXIT                                                     092S1285
   11 L=((NN-1)/5+1)                                                092S1286
      GO TO (100,200,200,12),L
  100 PND=XX/2117.                                                  092S1288
      CALL PROPR(PND,YY,HH)                                         092S1289
      GO TO (12,1,2,3,4),NN                                         092S1290
    1 STOR=HH*847500.                                               092S1291
      GO TO 10                                                      092S1292
    2 CALL MOLIER(PND,HH,RR,3)                                      092S1293
      STOR=RR*2.498E-3                                              092S1294
      GO TO 10                                                      092S1295
    3 CALL MOLIER(PND,HH,TT,4)                                      092S1296
      STOR=TT*491.69
      GO TO 10                                                      092S1298
    4 CALL MOLIER(PND,HH,AA,1)                                      092S1299
      STOR=AA*9.20598E2                                             092S1300
      GO TO 10                                                      092S1301
  200 NNN=NN-5                                                      092S1302
      PND=XX/2117.                                                  092S1303
      HH=YY/847500.                                                 092S1304
      GO TO (12,5,6,7,8,9),NNN
    5 CALL MOLIER(PND,HH,SR,2)                                      092S1306
      STOR=SR                                                       092S1307
      GO TO 10                                                      092S1308
    6 CALL MOLIER(PND,HH,RR,3)                                      092S1309
      STOR=RR*2.498E-3                                              092S1310
      GO TO 10                                                      092S1311
    7 CALL MOLIER(PND,HH,TT,4)                                      092S1312
      STOR=TT*491.69
      GO TO 10                                                      092S1314
    8 CALL MOLIER(PND,HH,AA,1)                                      092S1315
      STOR=AA*9.20598E2                                             092S1316
      GO TO 10
    9 CALL MOLIER(PND,HH,RR,3)
      RD=RR*2.498E-3
      STOR=YY-XX/RD
   10 RETURN                                                        092S1317
      END                                                           092S1318
```

```
      SUBROUTINE MOLIER (P,H,STAR,I)                                    092S1359
C                                                                       092S1360
C *****SUBROUTINE MOLIER FOR LINKS ONE AND TWO AND THREE***************092S1361
C                                                                       092S1362
      DIMENSION D(29)                                                   092S1363
      EQUIVALENCE(D(4),PLOG),(D(5),CONA),(D(6),CONB),(D(7),SR),(D(8),TSM092S1364
     1ALL),(D(9),THETA),(D(10),ASMALL),(D(11),BSMALL),(D(12),CSMALL),(D(092S1365
     213),DSMALL),(D(14),CIRH),(D(15),TAU1),(D(16),FSMALL),(D(17),GSMALL092S1366
     3),(D(18),SMALLM),(D(19),TAU),(D(20),ZT,TEMP),(D(21),RHO),(D(22),EP092S1367
     4S),(D(23),CHI),(D(24),ETA),(D(25),SIGMA),(D(26),ZETA),(D(27),SONIC092S1368
     5),(D(28),VEL),(D(29),ART)                                         092S1369
C                                  ZERO OUT STORAGE                     092S1370
      DO 1 N=1,29                                                       092S1371
    1 D(N)=0.0                                                          092S1372
C                                  STORE VALUES OF P,H,I                092S1373
      J=I                                                               092S1374
      D(1)=FLOAT(J)                                                     092S1375
      D(2)=P                                                            092S1376
      D(3)=H                                                            092S1377
C                                  COMPUTE LOG P/PO                     092S1378
      PLOG=0.43429448*ALOG(D(2))                                        092S1379
  333 GO TO (100,400,100,200),J                                         092S1380
C                                  I=1,COMPUTE SONIC VELOCITY           092S1381
C                                  I=2,COMPUTE ENTROPY                  092S1382
C                                  I=3,COMPUTE DENSITY                  092S1383
C                                  I=4, COMPUTE TEMPERATURE             092S1384
C     DENSITY                      COMPUTE SMALLT                       092S1385
  100 TSMALL=5224.0/(33.842-PLOG)+(-1.7609)*(PLOG+68.5)                 092S1386
C                                  COMPUTE THETA                        092S1387
      THETA=12.813+0.46218*((PLOG+4.1)**2)                              092S1388
C                                  COMPUTE COEF OF CIRH                 092S1389
      GO TO 201                                                         092S1390
C                                  COMPUTE TAU1                         092S1391
  101 TAU1=EXP(D(3)/50.0-10.0)                                          092S1392
      TAU1=(9.2217+(-.27639)*((PLOG+3.5)**2))*TAU1                      092S1393
      GO TO (300,500,102,500),J                                         092S1394
C                                  COMPUTE TAU                          092S1395
  102 FSMALL=EXP(-2.0*(PLOG-0.75))+1.0                                  092S1396
      FSMALL=-1.83+1.098/FSMALL                                         092S1397
      GSMALL=+0.00038+0.000953/(PLOG+4.85)                              092S1398
      SMALLM=-84.6+(-0.8)*PLOG*(1.0-0.5*PLOG)                           092S1399
      TAU=-GSMALL*((D(3)+SMALLM)**2)                                    092S1400
      TAU=FSMALL*EXP(TAU)                                               092S1401
      ZT=CIRH+TAU+TAU1                                                  092S1402
C                                  COMPUTE DENSITY                      092S1403
      RHO=D(2)/ZT                                                       092S1404
      STOR=RHO                                                          092S1405
  199 STAR=STOR                                                         092S1406
      RETURN                                                            092S1407
C                                  COMPUTE T/TO-TEMPERATURE             092S1408
C                                  COMPUTE SMALL T                      092S1409
  200 TSMALL=230.6335/(10.0-PLOG)+0.183042*(PLOG+3.0)                   092S1410
C                                  COMPUTE THETA                        092S1411
      THETA=2.1965+0.31961*((PLOG+4.1)**2)                              092S1412
C                                  CALCULATE COEF. OF HTHETA=CIRH       092S1413
  201 DSMALL=(THETA-TSMALL)/(2.0*TSMALL-THETA-79.4)                     092S1414
      BSMALL=79.4+(1.0+DSMALL)*(TSMALL-79.4)                            092S1415
      ASMALL=(79.4-BSMALL)*DSMALL                                       092S1416
      CSMALL=-ASMALL*DSMALL                                             092S1417
      CIRH=ASMALL+(BSMALL*D(3))/250.0+CSMALL/(D(3)/250.0+DSMALL)        092S1418
```

```
      GO TO (101,500,101,202),J                                        092S1419
  202 FSMALL=EXP(-2.0*PLOG)+1.0                                        092S1420
      FSMALL=-2.1965+1.46434/FSMALL                                    092S1421
      GSMALL=-0.00065+0.0120960/(PLOG+9.6)                             092S1422
      SMALLM=-94.2+(-1.6)*PLOG*(1.0-.5*PLOG)                           092S1423
      TAU=-GSMALL*((D(3)+SMALLM)**2)                                   092S1424
      TAU=FSMALL*EXP(TAU)                                              092S1425
C                                     COMPUTE TAU1                     092S1426
      TAU1=EXP(D(3)/50.0-10.0)                                         092S1427
      TAU1=(5.4913+(-.56743)*((PLOG+1.75)**2))*TAU1                    092S1428
      TEMP=CIRH+TAU+TAU1                                               092S1429
      STOR=TEMP                                                        092S1430
      GO TO 199                                                        092S1431
C                                     COMPUTE SONIC VELOCITY           092S1432
  300 SONIC=SQRT (CIRH+TAU1)                                           092S1433
C                                     COMPUTE SPECIFIC HEAT            092S1434
      EPS=1.0459+0.009775*PLOG                                         092S1435
      CHI=(12.707-0.9775*PLOG)*0.00001                                 092S1436
      ETA=1.1828-EPS                                                   092S1437
      SIGMA=-(0.001955+CHI)/ETA                                        092S1438
      ZETA=EXP(SIGMA*D(3))                                             092S1439
      ZETA=EPS+CHI*D(3)+ETA*ZETA                                       092S1440
      VEL=SONIC*ZETA                                                   092S1441
C                                     COMPUTE TAU COEF.                092S1442
      FSMALL=EXP(-2.0*PLOG)+1.0                                        092S1443
      FSMALL=-0.5+0.35454/FSMALL                                       092S1444
      GSMALL=0.002                                                     092S1445
      SMALLM=-80.0+(-1.28)*PLOG*(1.0-PLOG)                             092S1446
      TAU=-GSMALL*((D(3)+SMALLM)**2)                                   092S1447
      TAU=FSMALL*EXP(TAU)                                              092S1448
C                                     COMPUTE SONIC VELOCITY           092S1449
      ART=VEL+TAU                                                      092S1450
      STOR=ART                                                         092S1451
      GO TO 199                                                        092S1452
C                                     COMPUTE S/R-ENTROPY              092S1453
  400 CONB=0.07*(45.0-D(3))                                            092S1454
      CONB=1.0+EXP(CONB)                                               092S1455
      CONB=-2.307-(0.0042*D(3)-.092)/CONB                              092S1456
      CONA=11.1*0.43429448*ALOG(D(3))                                  092S1457
      CONA=CONA+11.875+0.0245*D(3)+175.0/(D(3)+50.0)                   092S1458
      SR=CONA+CONB*PLOG                                                092S1459
      STOR=SR                                                          092S1460
      GO TO 199                                                        092S1461
  500 WRITE(6,502)                                                     092S1462
      CALL DUMP(D,D(29),1)                                             092S1463
  502 FORMAT(35H1  LOST IN LOOP - EXITING WITH DUMP)                   092S1464
      GO TO 199                                                        092S1465
      END                                                              092S1466
```

```
      SUBROUTINE PROPR(P,SR,HSTOR)                                      092S1320
      DIMENSION HH(25),SS(25)                                           092S1321
      EQUIVALENCE (HH,PLOG),(SS,TOL),(HH(2),SOR)                        092S1322
      SS(2)=P                                                           092S1323
      PLOG=0.43429448*ALOG(SS(2))                                       092S1324
      SOR=SR                                                            092S0132
      HH(3)=HSTOR                                                       092S1326
      TOL=0.00001                                                       092S1327
      DO 100 JG=3,23                                                    092S1328
    1 EXX=EXP(0.07*(45.0-HH(JG)))                                       092S1329
      SS(JG)=11.1*0.43429448*ALOG(HH(JG))+11.875+.0245*HH(JG)           092S1330
      SS(JG)=175.0/(HH(JG)+50.0)+SS(JG)                                 092S1331
      SS(JG)=-2.307*PLOG-PLOG*(0.0042*HH(JG)-.092)/(1.0+EXX)+SS(JG)     092S1332
      DEL=EXX*(0.07*(0.0042*HH(JG)-.092)+0.0042)+0.0042                 092S1333
      DEL=PLOG*DEL/((1.0+EXX)**2)                                       092S1334
      DEL=(11.1*0.43429448)/HH(JG)+0.0245-175.0/((HH(JG)+50.0)**2)-DEL  092S1335
      DEL=(SOR-SS(JG))/DEL                                              092S1336
      IF(ABS (DEL/HH(JG))-TOL)200,200,50                                092S1337
   50 HH(JG+1)=HH(JG)+DEL                                               092S1338
      IF(HH(JG+1)) 101,101,100                                          092S1339
  100 CONTINUE                                                          092S1340
  101 WRITE(6,500)SS(2),SOR,PLOG,TOL,(HH(L),L=3,23),(SS(L),L=3,23)      092S1341
  500 FORMAT(1H1,40X,39HFAILURE TO CONVERGE ON ENTHALPY AT BODY/(1P8E15.092S1342
     17))                                                               092S1343
  200 HH(JG+1)=HH(JG)+DEL                                               092S1345
      IF(HH(JG+1)) 101,101,201                                          092S1346
  201 EXX=EXP(0.07*(45.0-HH(JG+1)))                                     092S1347
      SS(JG+1)=11.1*0.43429448*ALOG(HH(JG+1))+11.875                    092S1348
      SS(JG+1)=SS(JG+1)+.0245*HH(JG+1)+175.0/(HH(JG+1)+50.0)            092S1349
      SS(JG+1)=-2.307*PLOG+SS(JG+1)                                     092S1350
      SS(JG+1)=SS(JG+1)-PLOG*(0.0042*HH(JG+1)-0.092)/(1.0+EXX)          092S1351
      IF(ABS((SOR-SS(JG+1))/SOR)-0.00001)400,400,300                    092S1352
  300 TOL=TOL/2.0                                                       092S1353
      GO TO 100                                                         092S1354
  400 HSTOR=HH(JG+1)                                                    092S1355
      RETURN                                                            092S1356
      END                                                               092S1357
```

```
      SUBROUTINE CONVR1

      INCLUDE PROC,LIST
      DIMENSION R(NN,MM),U(NN,MM),V(NN,MM),E(NN,MM),C(NN,MM,7)
      COMMON/DIFF1/Q(NN,MM,JJ),UN(NN,MM,JJ)
      EQUIVALENCE (UN(1,1,1),R(1,1)),(UN(1,1,2),U(1,1)),(UN(1,1,3),V(
     1             1,1)),(UN(1,1,4),E(1,1)),(UN(1,1,5),C(1,1,1))
C
      CALL REGION
C
      DO 1 M=1,MC
      SN(M)=S(M)
      STN(M)=ST(M)
      DO 1 N=2,NC
      H123=HH1(N,M)*HH2(N,M)
      Q(N,M,1)=H123*EXP(R(N,M))
      Q(N,M,2)=Q(N,M,1)*U(N,M)
      Q(N,M,3)=Q(N,M,1)*V(N,M)
      Q(N,M,4)=Q(N,M,1)*(E(N,M)+0.5*(U(N,M)**2.+V(N,M)**2.))
      P(N,M)=EXP(P(N,M))
      DO 11 J=5,JC
   11 Q(N,M,J)=C(N,M,J-4)*Q(N,M,1)
    1 CONTINUE
C
      DO 2 J=1,JC
      DO 2 M=1,MC
      DO 2 N=2,NC
      Q(N,M,J)=Q(N,M,J)*S(M)
      UN(N,M,J)=Q(N,M,J)
    2 CONTINUE
C
C
      RETURN
      END
C
C
```

```
      SUBROUTINE REGION

      INCLUDE PROC,LIST

      DO 1 M=1,MC
      DO 1 N=2,NC
      HH1(N,M)=1.+CURV(M)*S(M)*(1.-NU(N))
      HH2(N,M)=1.
      HH3(N,M)=YB(M)+S(M)*(1.-NU(N))*COS(PHI(M))
      HH3(N,1)=-HH3(N,3)
      IF(LB.EQ.0)HH3(N,M)=1.
C
    1 CONTINUE
C
      RETURN
      END
C
C
```

```
      SUBROUTINE DIFF

      INCLUDE PROC,LIST
      DOUBLE PRECISION SUM,UD
      DIMENSION UD(JJ)
      DIMENSION F(3,3,JJ),G(3,3,JJ),H(JJ),DISS(10)
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
      COMMON/DISS1/WWW(10),DT
      EQUIVALENCE (DISS,UJ(5))

      SOLVE THE DIFFERENTIAL EQUATION

      II=-1
    5 CONTINUE
      DO 1 N=2,NC
      DO 1 M=2,MCM
          DO 11 NI=1,3
          DO 11 MI=1,3
      IF(NI.NE.2.AND.MI.NE.2) GO TO 11
          IF(NI.EQ.1)NL=N-1
          IF(NI.EQ.2)NL=N
          IF(NI.EQ.3)NL=N+1
          IF(MI.EQ.1)ML=M-1
          IF(MI.EQ.2)ML=M
          IF(MI.EQ.3)ML=M+1
      IF(NL.EQ.1.OR.NL.EQ.NC+1) GO TO 11
      IF(II.EQ.-1.AND.MI+NI.GT.4.AND.N.NE.2) GO TO 11
      IF(II.EQ.1.AND.MI+NI.LT.4.AND.N.NE.NC) GO TO 11

      H1=HH1(NL,ML)
      H2=HH2(NL,ML)
      H3=HH3(NL,ML)
      H12=H1*H2
      H23=H2
      H31=H1
      H123=H12

      CALL CONVR2(NL,ML)
          PI11=P(NL,ML)
          PI22=P(NL,ML)
          PI33=P(NL,ML)
      IF(RE.GT.1.E8)GO TO 99
      CALL TRANSC(NL,ML)
      CALL STRESS(NL,ML)
      CALL DIFFUS(NL,ML)
      CALL HEAT(NL,ML)
   99 CONTINUE
        VECTORS IN THE PHYSICAL SPACE
        F(NI,MI,1)=H23*U1*U2
        F(NI,MI,2)=H23*(U1*U2*U2+PI11)
        F(NI,MI,3)=H23*(U1*U2*U3+PI12)
        F(NI,MI,4)=H23*((U1*U4+PI11)*U2+PI12*U3+Q1)
      DO 101 J=5,JC
  101 F(NI,MI,J)=H23*(U1*U2*UJ(J)+D1(J-4))

      IF(MI.NE.2) GO TO 12
        G(NI,MI,1)=H31*U1*U3
        G(NI,MI,2)=H31*(U1*U2*U3+PI21)
        G(NI,MI,3)=H31*(U1*U3*U3+PI22)
        G(NI,MI,4)=H31*((U1*U4+PI22)*U3+PI21*U2+Q2)
```

```
      DO 102 J=5,JC
  102 G(NI,MI,J)=H31*(U1*U3*UJ(J)+D2(J-4))
   12 CONTINUE
C
C     VECTORS IN THE FIRST COMPUTATIONAL PLANE
C
      IF(NI.NE.2.OR.MI.NE.2) GO TO 13
      RR=((1.-NU(NL))*SXI(ML)+BXI(ML))/S(ML)
      DO 153 J=1,JC
  153 H(J)=0.
        H(2)=S(ML)*((-1./S(ML))*H1NU*(U1*U2*U3+PI12))
        H(3)=S(ML)*(-(-1./S(ML))*H1NU*(U1*U2*U2+PI11))
      IF(N.EQ.2) GO TO 113
      CALL DISSS(U1,T(NL,ML),DISS)
      DO 103 J=5,JC
  103 H(J)=-H123*S(ML)*U1*WWW(J-4)
  113 CONTINUE
      IF(LB.EQ.0) GO TO 13
      IF(M.NE.2) GO TO 143
      H(3)=H(3)-S(ML)*H1*PI33*(-1./S(ML))*H3XINU/H3XI
      DO 123 J=1,JC
  123 H(J)=H(J)+S(ML)*((-1./S(ML))*H3XINU*G(NI,MI,J)+(H3XIXI+
     1     (1.-NU(NL))*(SXI(ML+1)-SXI(ML-1))/S(ML)**2.*H3NU)*F(NI,MI,J))/
     2       H3XI
      GO TO 13
  143 CONTINUE
      H(2)=H(2)-S(ML)*H2/H3*(H3XI+RR*H3NU)*PI33
      H(3)=H(3)-S(ML)*H1/H3*(-1./S(ML))*H3NU*PI33
      DO 133 J=1,JC
  133 H(J)=H(J)+S(ML)/H3*((H3XI+RR*H3NU)*F(NI,MI,J)+(-1./S(ML))*
     1          H3NU*G(NI,MI,J))
   13 CONTINUE
C
      IF(MI.NE.2) GO TO 14
      DO 104 J=1,JC
  104 G(NI,MI,J)=-G(NI,MI,J)+(1.-NU(NL))*(SXI(ML)*F(NI,MI,J)
     1        +ST(ML)*U(NL,ML,J)/S(ML))
   14 CONTINUE
C
      IF(NI.NE.2) GO TO 15
      DO 105 J=1,JC
  105 F(NI,MI,J)=S(ML)*F(NI,MI,J)
   15 CONTINUE
C     VECTORS IN THE SECOND COMPUTATIONAL PLANE
C
      DO 122 J=1,JC
      IF(NI.EQ.2.AND.MI.EQ.2)H(J)=H(J)-BETA*G(NI,MI,J)
      IF(MI.EQ.2) GO TO 122
      G(NI,MI,J)=SQEZ(NL)*G(NI,MI,J)
  122 CONTINUE
C
   11   CONTINUE
C
      DNUBAR=DNU/SQEZ(N)
      NSPEC=JC-4
      DT1=AMIN1(DXI/(ABS(U(N,M,2)/U(N,M,1))+A(N,M)),
     1          DNUBAR*S(M)/(ABS(U(N,M,3)/U(N,M,1))+A(N,M)))/3.
      DT=0.1/ABS(WWW(NSPEC))
      DO 55 I=1,NSPEC
      IF(ABS(WWW(I)).GT.0.)DTT=0.1/ABS(WWW(I))
```

```
      IF(DTT-DT)45,55,55
   45 DT=DTT
   55 CONTINUE
      DT2=AMIN1(DT,DT1)

        DO 22 J=1,JC
        III=II

        IF(N.EQ.2) II=1
        IF(N.EQ.NC)II=-1
         GNU=((II-1)*G(1,2,J)-2*II*G(2,2,J)+(II+1)*G(3,2,J))/2./DNU
        II=III
         FXI=((II-1)*F(2,1,J)-2*II*F(2,2,J)+(II+1)*F(2,3,J))/2./DXI
C
      IF(LB.EQ.1.AND.M.EQ.2)FXI=2.*FXI
         UT=-FXI-GNU-H(J)
      DTT=DT1
      IF(J.GE.5)DTT=DT2
         IF(II.EQ.-1)UN(N,M,J)=U(N,M,J)+UT*DTT
         IF(II.EQ.1)UN(N,M,J)=0.5*(UN(N,M,J)+U(N,M,J)+UT*DTT)
      IF(J.GE.5.AND.UN(N,M,J).LE.0)UN(N,M,J)=0.
   22 CONTINUE
C
      SUM=0.
      DO 33 J=5,JC
      UD(J)=UN(N,M,J)/UN(N,M,1)
   33 SUM=SUM+UD(J)
C
      DO 44 J=5,JC
   44 UN(N,M,J)=UD(J)/SUM*UN(N,M,1)
    1 CONTINUE


      EXTRAPOLATION TO THE AXIS OF SYMMETRY


      EXTRAPOLATION TO OUTER BOUNDARY

      DO 2 N=2,NC
      UN(N,2,2)=0.
      DO 2 J=1,JC
      UN(N,MC,J)=2.*UN(N,MCM,J)-UN(N,MCM-1,J)
    2 CONTINUE
C
      CALL SHOCK
      CALL WALL


      DEFINE MIRROR POINTS

      DO 3 N=2,NC
      DO 3 J=1,JC
      UN(N,1,J)=UN(N,3,J)
      UN(N,1,2)=-UN(N,3,2)
    3 CONTINUE


      STORE VALUES TO DIFFERENT LEVEL

      DO 4 M=1,MC
```

```
      DO 4 J=1,JC
      UU=U(N,M,J)
      U(N,M,J)=UN(N,M,J)
      IF(II.EQ.1) GO TO 4
      UN(N,M,J)=UU
    4 CONTINUE
C
C     EXTRAPOLATION TO THE AXIS OF SYMMETRY
C
      DO 6 N=2,NC
      DO 7 M=2,MC
      CALL CONVR2(N,M)
      U4=U4-0.5*(U2**2.+U3**2.)
      CALL THERM(2,U1,U4,T(N,M))
      CALL THERM(1,U1,U4,P(N,M))
      CALL THERM(3,U1,U4,A(N,M))
    7 CONTINUE
      P(N,1)=P(N,3)
      T(N,1)=T(N,3)
      A(N,1)=A(N,3)
    6 CONTINUE
C
      IF(II.EQ.1) RETURN
      II=1
      GO TO 5
C
      END
C
C
```

```
      SUBROUTINE CONVR?(N,M)
      INCLUDE PROC,LIST
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
C
C
C
C     U1=RHO,U2=U,U3=V,U4=E+0.5*Q**2.
      U1=U(N,M,1)/S(M)/HH1(N,M)/HH2(N,M)
      U2=U(N,M,2)/U(N,M,1)
      U3=U(N,M,3)/U(N,M,1)
      U4=U(N,M,4)/U(N,M,1)
      SUM=0.
      DO 2 J=5,JC
    2 UJ(J)=U(N,M,J)/U(N,M,1)
C
C     EASIER TO CALCULATE H1XI AND H3XI THIS WAY
      H1XI=(HH1(N,M+1)-HH1(N,M-1))/2./DXI
      IF(M.EQ.MC)H1XI=(HH1(N,MC)-HH1(N,MCM))/DXI
      H1NU=-CURV(M)*S(M)
      H1NU=H1NU*SQEZ(N)
      H2XI=0.
      H2NU=0.
      H3XI=(HH3(N,M+1)-HH3(N,M-1))/2./DXI*LB
      IF(M.EQ.1)H3XI=(HH3(N,4)-HH3(N,2))/2./DXI *LB
      IF(M.EQ.MC)H3XI=(HH3(N,MC)-HH3(N,MCM))/DXI*LB
      H3NU=-S(M)*COS(PHI(M))*LB
      IF(M.EQ.1)H3NU=S(1)*COS(PHI(1))*LB
      H3NU=H3NU*SQEZ(N)
C
      H3XIXI=0.
      H3XINU=-S(M)*LB
      H3XINU=H3XINU*SQEZ(N)
C
C
      RETURN
      END
C
C
```

```
      SUBROUTINE TRANSC(N,M)
      INCLUDE PROC,LIST
      REAL LEWI
      LOGICAL FROZN,SIMPL,ISOTH,CATAL
      COMMON/CONTRL/FROZN,SIMPL,ISOTH,CATAL
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
      COMMON/JANAF1/GRRT(10),HRR(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
      COMMON/INPUT1/COEF(2,7,10),Q(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/TRANS1/CPRR(10),HRRT(10),CVIBR(10),RDTM(10),RELXTN(10),
     1ANS(15),LEWI(10,10)
      EQUIVALENCE (ANS(1) ,VISC  ), (ANS(2) ,MONCON), (ANS(3) ,INTCON)  INPT  42
      EQUIVALENCE (ANS(4) ,FRZCON), (ANS(5) ,REACON), (ANS(6) ,EQCON )  INPT  43
      EQUIVALENCE (ANS(7) ,CPFROZ), (ANS(8) ,CPEQ  ), (ANS(9) ,PRFROZ)  INPT  44
C                                                                       INPT  47
      WSUM=0.
      DO 3 I=5,JC
    3 WSUM=WSUM+UJ(I)/WMOL(I-4)
      WSUM=1./WSUM
      DO 1 I=5,JC
    1 XS(I-4)=UJ(I)/WMOL(I-4)*WSUM
      CPTOT=0.
      DO 4 I=5,JC
    4 CPTOT=CPTOT+XS(I-4)*CPRR(I-4)
      GAMA=CPTOT/(CPTOT-1.)
      TT=T(N,M)*TIN/1.8
      CALL JANAF(TT)
      CALL TRANSP(T(N,M),P(N,M))
      REVARI= SQRT(GAMMA)*ACH/(0.06721*VISC)*SQRT(PIN*RIN)*32.174*1.E6
      IF(.NOT.SIMPL)PR=ANS(9)
      IF(SIMPL)REVARI=RE*(T(N,M)+0.5)/1.5/T(N,M)**1.5
      AP1=GAMMA**0.5*ACH/REVARI
      AP2=GAMMA**0.5*ACH*GAMA/(GAMA-1.)/REVARI/PR
      DO 2 J=1,NM
      DO 2 I=1,NM
      IF(SIMPL)LEWI(I,J)=LEWIS
    2 AP3(I,J)=GAMMA**0.5*ACH/REVARI/PR*LEWI(I,J)*WMOL(I)/WSUM
      RETURN
      END
    3 CONTINUE
```

```
      SUBROUTINE TRANSP(T,P)
      RETURN
      END
C
```

```
      SUBROUTINE JANAF(TT)
      DIMENSION C(10),HZERO(10)
      COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/TRANS1/CPRR(10),HRRT(10),CVIBR(10),ROTM(10),RELXTN(10),
     1ANS(15),LEWI(10,10)
      COMMON/INPUT3/TLOW,TMID,THIGH
      COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
      COMMON/JANAF1/GRRT(10),HHH(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
      EQUIVALENCE (HZERO,HO),(NM,NSPEC),(C,XS)
      DATA R/1.987/
C                                                                     TRAN 132
      K=1                                                           TRAN 133
      IF(TT.LE.TMID) K=2                                            TRAN 134
      DO 26 J=1,NSPEC
      I=J
      CPRR(I)=(((COEF(K,5,J)*TT+COEF(K,4,J))*TT+COEF(K,3,J))*TT+    TRAN 137
     1 COEF(K,2,J))*TT+COEF(K,1,J)                                  TRAN 138
      HRRT(I) = ((((COEF(K,5,J)/5.)*TT+COEF(K,4,J)/4.)*TT+COEF(K,3,J)/  TRAN 139
     1 3.)*TT+COEF(K,2,J)/2.)*TT+COEF(K,1,J)+COEF(K,6,J)/TT         TRAN 140
      GRRT(J)=COEF(K,1,J)*(1.-ALOG(TT))-(((COEF(K,5,J)*3/5.*TT+COEF(K,4,
     1J))*TT/2.+COEF(K,3,J))*TT/3.+COEF(K,2,J))*TT/2.+COEF(K,6,J)/TT
     1-COEF(K,7,J)
      HHH(I)=HRRT(I)*R*TT-HZERO(I)
      HHH(I)=HHH(I)*1.8/R /WMOL(I)*1545.33*32.174
      HHH(I)=HHH(I)/PIN*RIN
   26 CONTINUE                                                      TRAN 141
C                                                                   TRAN 142
      RETURN
      END
      CPTOT=3.5
      CVTOT=2.5
C
C
```

```
      SUBROUTINE THERM(N,X,Y,STOR)
C
      PARAMETER JJ=11
      COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
      COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
     1             H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
      DIMENSION WSHA(3),ERR(3)
      DIMENSION C(10),HZERO(10),ERRT(10),E(10)
      COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/TRANS1/CPRR(10),HRRT(10),CVIRR(10),RDTM(10),RELXTN(10),
     1ANS(15),LEWI(10,10)
      COMMON/INPUT3/TLOW,TMID,THIGH
      EQUIVALENCE (HZERO,HO),(C,UJ(5))
      DATA RR/1.987/,R/1545.33/,CONVER/32.154/
C     DEFINE OTHER THERMODYNAMIC PROPERTIES
C
      EOEIN=Y*PIN/RIN
      NSPEC=5
      RORIN=X*RIN
      GAMMA=GAMAR(RORIN,EOEIN)
C
      GO TO (101,102,103,104),N
  101 STOR=X*TT*1.8/TIN*28.853/WSUM
      GO TO 10
C     TEMPERATURE
  102 TOTIN=(GAMMA-1.)*EOEIN/R
      TT=TOTIN/1.8
      KIP=1
      ME=1
      WSHA(ME)=TT
      UWSA=EOEIN/PIN*RIN
   30 CONTINUE
      TT=WSHA(ME)
      K=1
      IF(TT.LE.TMID) K=2
      DO 91 J=1,NSPEC
      I=J
      ERRT(I) = ((((COEF(K,5,J)/5.)*TT+COEF(K,4,J)/4.)*TT+COEF(K,3,J)/
     1 3.)*TT+COEF(K,2,J)/2.)*TT+COEF(K,1,J)+COEF(K,6,J)/TT-HZERO(I)/RR/
     2    TT-1.
   91 E(I)=ERRT(I)*TT*1.8/WMOL(I)*1545.33*32.174/PIN*RIN
      ETOT=0.
      DO 201 I=1,NSPEC
  201 ETOT=ETOT+E(I)*C(I)
      UWS=ETOT
      ERR(ME)=UWSA-UWS
      IF(ABS(ERR(ME)/UWSA)-0.01  )26,26,27
   27 GO TO (28,29,30),ME
   28 ME=2
      WSHA(2)=WSHA(1)+100.
      GO TO 30
   29 TT=WSHA(1)-ERR(1)*(WSHA(2)-WSHA(1))/(ERR(2)-ERR(1))
      WSHA(1)=WSHA(2)
      ERR(1)=ERR(2)
      WSHA(2)=TT
      KIP=KIP+1
      IF(KIP-20)30,30,31
   31 WRITE(6,100)TT
  100 FORMAT(  )
```

```
   26  CONTINUE
       IF(TT.LE.TLOW)TT=TLOW
       IF(TT.GT.THIGH)TT=THIGH
       K=1
       IF(TT.LE.TMID) K=2
       DO 1 J=1,NSPEC
    1  CPRR(J)=(((COEF(K,5,J)*TT+COEF(K,4,J))*TT+COEF(K,3,J))*TT+          TRA
      1 COEF(K,2,J))*TT+COEF(K,1,J)
       WSUM=0.
       DO 331 I=1,NSPEC
       WSUM=WSUM+C(I)/WMOL(I)
  331  CONTINUE
       WSUM=1./WSUM
       CPTOT = 0.0
  1000 DO 2001 I=1,NSPEC
       CPTOT=CPTOT+C(I)*CPRR(I)/WMOL(I)*WSUM
  2001 CONTINUE
       GAMMA=CPTOT/(CPTOT-1.)
       STOR=TT/TIN*1.8
       GO TO 10
C      SOUND SPEED
   103 SOUND=GAMMA*(GAMMA-1.)*EOEIN
       SOUND=ABS(SOUND)
       STOR=SQRT(SOUND/PIN*RIN)
       GO TO 10
C      ENTHALPY
   104 HOHIN=EOEIN+STOR*PIN/RORIN
       STOR=HOHIN/PIN*RIN
       GO TO 10
C
   10  RETURN
       END
C
C
```

```
C
C
      FUNCTION GAMAR(RHO,EE)
      GAMAR=1.4
      RETURN
      END
```

```
      FUNCTION GAMAR(RHO,EE)
      DATA RCON,ECON/.516,.932E-7/
      DATA ROZERO/1.2E-3/
C
      EE=ABS(EE)
      R=RHO/ROZERO*RCON
      E=EE*ECON
      E1=8.5+.357*ALOG10(R)
      E2=45.0*R**0.0157
      DELE1=0.975*R**0.05
      DELE2=4.0*R**0.085
C
      F1=1./(EXP((E-E1)/DELE1)+1.)
      F2=1./(EXP((-E+E2)/DELE2)+1.)
C
      G1=EXP(-E/4.46)
      G2=EXP(-E/6.63)
      G3=EXP(-E/25.5)
C
      ALPHA=0.048*F1*ALOG10(E)+0.032*(1.-F1)*(1.-F2)*ALOG10(E)+0.045*F2
      GAMFR1=R**ALPHA*(0.161+0.255*F1*G1+0.28*(1.-F1)*G2+0.137*F2*G3)
      GAMAR=GAMFR1+1.
C
      RETURN
      END
C
```

```
      SUBROUTINE STRESS(N,M)
C
      INCLUDE PROC,LIST
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
C
      RR=((1.-NU(N))*SXI(M)+BXI(M))/S(M)
      II=0
C
      III=II
      IF(N.EQ.2) II=1
      IF(N.EQ.NC) II=-1
      UNU=((II-1)*U(N-1,M,2)/U(N-1,M,1)-2*II*U(N,M,2)/U(N,M,1)
     1      +(II+1)*U(N+1,M,2)/U(N+1,M,1))/2./DNU
      VNU=((II-1)*U(N-1,M,3)/U(N-1,M,1)-2*II*U(N,M,3)/U(N,M,1)
     1      +(II+1)*U(N+1,M,3)/U(N+1,M,1))/2./DNU
      UOH1NU=((II-1)*U(N-1,M,2)/U(N-1,M,1)/HH1(N-1,M)-2*II*U(N,M,2)/
     1      U(N,M,1)/HH1(N,M)+(II+1)*U(N+1,M,2)/U(N+1,M,1)/HH1(N+1,M))/2.
     2      /DNU
      VOH2NU=((II-1)*U(N-1,M,3)/U(N-1,M,1)/HH2(N-1,M)-2*II*U(N,M,3)/
     1      U(N,M,1)/HH2(N,M)+(II+1)*U(N+1,M,3)/U(N+1,M,1)/HH2(N+1,M))/2.
     2      /DNU
      UNU=UNU*SQEZ(N)
      VNU=VNU*SQEZ(N)
      UOH1NU=UOH1NU*SQEZ(N)
      VOH2NU=VOH2NU*SQEZ(N)
      II=III
C
      III=II
      IF(M.EQ.1)II=1
      IF(M.EQ.3)II=-1
      IF(M.EQ.MC)II=-1
      UXI=((II-1)*U(N,M-1,2)/U(N,M-1,1)-2*II*U(N,M,2)/U(N,M,1)
     1      +(II+1)*U(N,M+1,2)/U(N,M+1,1))/2./DXI
      VOH2XI=((II-1)*U(N,M-1,3)/U(N,M-1,1)/HH2(N,M-1)-2*II*U(N,M,3)/
     1      U(N,M,1)/HH2(N,M)+(II+1)*U(N,M+1,3)/U(N,M+1,1)/HH2(N,M+1))/
     2      2./DXI
      II=III
C
      E11=2.*AP1*((UXI+RR*UNU)/H1+U3/H12*H1NU*(-1./S(M)))
      E22=2.*AP1*((-1./S(M))*VNU/H2+U2/H12*(H2XI+RR*H2NU))
      E33=2.*AP1*((H3XI+RR*H3NU)/H3/H1*U2+(-1./S(M))*H3NU/H2/H3*U3)
      IF(LB.EQ.1.AND.M.EQ.2)E33=2.*AP1*((UXI+RR*UNU)/H1+U3*H2*(-1./S(M)
     1      )*H3XINU/H3XI)
      E12=AP1*(H2/H1*(VOH2XI+RR*VOH2NU)+H1/H2*(-1./S(M))*UOH1NU)
      E21=E12
C
      PI11=P(N,M)-E11+1./3.*(E11+E22+E33)
      PI22=P(N,M)-E22+1./3.*(E11+E22+E33)
      PI33=P(N,M)-E33+1./3.*(E11+E22+E33)
      PI12=-E12
      PI21=-E21
C
      RETURN
      END
C
C
```

```
      SUBROUTINE DIFFUS(N,M)
      INCLUDE PROC,LIST
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
      DIMENSION SUM1(10),SUM2(10)
C
      II=0
      DO 1 J=5,JC
      III=II
      IF(M.EQ.1)II=1
      IF(M.EQ.3)II=-1
      IF(M.EQ.MC) II=-1
      DD1=((II-1)*U(N,M-1,J)/U(N,M-1,1)-2*II*U(N,M,J)/U(N,M,1)+(II+1)*
     1        U(N,M+1,J)/U(N,M+1,1))/2./DXI
      II=III
C
      III=II
      IF(N.EQ.NC)II=-1
      IF(N.EQ.2) II=1
      DD2=((II-1)*U(N-1,M,J)/U(N-1,M,1)-2*II*U(N,M,J)/U(N,M,1)+(II+1)*
     1          U(N+1,M,J)/U(N+1,M,1))/2./DNU
      II=III
      DD2=DD2*SQEZ(N)
C
      D1(J-4)=(DD1+(1.-NU(N))*SXI(M)/S(M)*DD2)/H1
      D2(J-4)=DD2*(-1.)/S(M)/H2
C
    1 CONTINUE
C
      DO 2 I=5,JC
      SUM1(I-4)=0.
      SUM2(I-4)=0.
    2 CONTINUE
C
      DO 3 I=5,JC
      DO 3 J=5,JC
      SUM1(I-4)=SUM1(I-4)-AP3(I-4,J-4)*D1(J-4)
      SUM2(I-4)=SUM2(I-4)-AP3(I-4,J-4)*D1(J-4)
    3 CONTINUE
C
      DO 4 J=5,JC
      D1(J-4)=SUM1(J-4)
      D2(J-4)=SUM2(J-4)
    4 CONTINUE
C
C
      RETURN
      END
C
C
```

```
      SUBROUTINE HEAT(N,M)
C
      INCLUDE PROC,LIST
      DIMENSION HI(2)
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
      COMMON/JANAF1/GRRT(10),HHH(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
C
      II=0
C
      III=II
      IF(M.EQ.1)II=1
      IF(M.EQ.3)II=-1
      IF(M.EQ.MC)II=-1
      QQ1=((II-1)*T(N,M-1)-2*II*T(N,M)+(II+1)*T(N,M+1))/2./DXI
      II=III
C
      III=II
      IF(N.EQ.NC) II=-1
      IF(N.EQ.2) II=1
      QQ2=((II-1)*T(N-1,M)-2*II*T(N,M)+(II+1)*T(N+1,M))/2./DNU
      QQ2=QQ2*SQEZ(N)
      II=III
C
      Q2=-AP2*QQ2*(-1.)/S(M)/H2
      Q1=-AP2*(QQ1+(1.-NU(N))*SXI(M)/S(M)*QQ2)/H1
C
      HI(1)=0.
      HI(2)=0.
      DO 2 J=5,JC
      HI(1)=HI(1)+HHH(J-4)*D1(J-4)
      HI(2)=HI(2)+HHH(J-4)*D2(J-4)
    2 CONTINUE
      Q1=Q1+HI(1)
      Q2=Q2+HI(2)
C
C
      RETURN
      END
C
C
```

```
      SUBROUTINE WALL
C
      INCLUDE PROC,LIST
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
      LOGICAL FROZN,SIMPL,ISOTH,CATAL
      COMMON/CONTRL/FROZN,SIMPL,ISOTH,CATAL
      DO 2 M=2,MC
C
      IF(RE.GT.1.E8) GO TO 1
      UN(NC,M,2)=0.
      UN(NC,M,3)=0.
      IF(.NOT.ISOTH)UN(NC,M,4)=UN(NC,M,1)*(UN(NCM,M,4)/UN(NCM,M,1)-0.5*(
     1          UN(NCM,M,2)**2+UN(NCM,M,3)**2)/UN(NCM,M,1)**2)
      IF(ISOTH)UN(NC,M,4)=UN(NC,M,1)*TW*EIN/PIN*RIN
C
C
C     BODY CATALYTICITY
      DO 3 J=5,JC
      IF(CATAL)UN(NC,M,J)=UN(2,M,J)/UN(2,M,1)*UN(NC,M,1)
      IF(.NOT.CATAL)UN(NC,M,J)=UN(NCM,M,J)/UN(NCM,M,1)*UN(NC,M,1)
    3 CONTINUE
    1 CONTINUE
      UN(NC,M,3)=0.
    2 CONTINUE
C
      RETURN
      END
C
C
```

```
      SUBROUTINE SHOCK
C
      INCLUDE PROC,LIST
      DIMENSION WSHA(3)
      COMMON/INPUR1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
     1FRACT(10),IPR(20,6)
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
C
      DO 1 M=2,MC
C     DEFINE THE ANGLE BETWEEN THE SHOCK TANGENT AND THE DECREASING
C     Z-AXIS
C
      PSI(M)=ATAN(SXI(M))
      THE=PSI(M)+PHI(M)
      UIN=U0*COS(THE)/SQRT(PIN/RIN)
      VIN=U0*SIN(THE)/SQRT(PIN/RIN)
      U1=UN(2,M,1)/S(M)
      U2=UN(2,M,2)/UN(2,M,1)
      UWSA=U4
      U3=UN(2,M,3)/UN(2,M,1)
      U4=UN(2,M,4)/UN(2,M,1)
      UWSA=U4-0.5*(U2**2.+U3**2.)
      KIP=1
      ME=1
      WSHA(ME)=ST(M)
   30 VNINR=VIN+WSHA(ME)*COS(PSI(M))
      VNINRD=VNINR*SQRT(PIN/RIN)
      CALL RANKIN(VNINRD,VCART,RS,PS,AB,TS)
      US=UIN
      VS=VCART-WSHA(ME)*COS(PSI(M))
      U2=US*COS(PSI(M))+VS*SIN(PSI(M))
      U3=US*SIN(PSI(M))-VS*COS(PSI(M))
      UWS=TS*EIN/PIN*RIN+0.5*(U2**2.+U3**2.)
      UWS=HIN/PIN*RIN+.5*(1.+1./RS)*(PS-1.)-PS/RS
      STN(M)=WSHA(ME)
      ERR(ME)=UWSA-UWS
      IF(ABS(ERR(ME)/UWSA)-EPS(1))26,26,27
   27 GO TO (28,29,30),ME
   28 ME=2
      WSHA(2)=WSHA(1)-EPS(2)
      GO TO 30
   29 STN(M)=WSHA(1)-ERR(1)*(WSHA(2)-WSHA(1))/(ERR(2)-ERR(1))
      WSHA(1)=WSHA(2)
      ERR(1)=ERR(2)
      WSHA(2)=STN(M)
      KIP=KIP+1
      IF(KIP-20)30,30,31
   31 WRITE(6,100)M,K
  100 FORMAT(  )
   26 CONTINUE
C
      UN(2,M,1)=RS
      UN(2,M,2)=U2
      UN(2,M,3)=U3
      UN(2,M,4)=HIN/PIN*RIN+.5*(1.+1./RS)*(PS-1.)-PS/RS+.5*(U2**2+U3**2)
      T(2,M)=TS
      P(2,M)=PS
      A(2,M)=AB
C
    1 CONTINUE
```

```
C
C     COMPUT NEW SHOCK POINTS
      DNUBAR=DNU/SQEZ(2)
      STN(1)=STN(3)
C
      DO 40 M=1,MC
      DT1=AMIN1(DXI/(ABS(U(2,M,2)/U(2,M,1))+A(2,M)),
     1          DNUBAR*S(M)/(ABS(U(2,M,3)/U(2,M,1))+A(2,M)))/3.
   40 SN(M)=S(M)+STN(M)*DT1
C
C
      DO 42 M=3,MCM
   42 SXI(M)=(SN(M+1)-SN(M-1))/2./DXI
      SXI(MC)=(SN(MC)-SN(MCM))/DXI
      SXI(1)=-SXI(3)
      SXI(2)=0.
C
      DO 55 M=1,MC
      S(M)=SN(M)
      ST(M)=STN(M)
      YS(M)=YB(M)+S(M)*COS(PHI(M))
      ZS(M)=ZB(M)+S(M)*SIN(PHI(M))
   55 CONTINUE
C
      CALL REGION
```



```
      DO 8 M=2,MC
      UN(2,M,1)=UN(2,M,1)*S(M)*HH1(2,M)*HH2(2,M)
      UN(2,M,2)=UN(2,M,1)*UN(2,M,2)
      UN(2,M,3)=UN(2,M,1)*UN(2,M,3)
      UN(2,M,4)=UN(2,M,1)*UN(2,M,4)
C
C     NON-DIFFUSOVE AND FROZEN SHOCK
C
      DO 18 J=5,JC
   18 UN(2,M,J)=FRACT(J-4)*UN(2,M,1)
    8 CONTINUE
C
      RETURN
      END
      CALL THERM(2,UN(2,M,1),UN(2,M,4),TS)
      RS=PS/TS
      UN(2,M,4)=TS*EIN/PIN*RIN+0.5*(U2**2.+U3**2.)
      UN(2,M,1)=RS
C
C
```

```
      SUBROUTINE RANKIN(UN,UCART,RS,PS,AS,TS)
      INCLUDE PROC,LIST
C
      UNIN=UN/SQRT(PIN/RIN)
      AMIN=UNIN**2./(AIN**2./(PIN/RIN))
C
      KIM=1
      RORIN=GE*AMIN/(1.+GD*AMIN)
  404 PS=1.+(1.-1./RORIN)*UNIN**2.
      HS=HIN/PIN*RIN+.5*(1.+1./RORIN)*(PS-1.)
      ES=HS-PS/RORIN
      CALL THERM(2,RORIN,ES,TS)
      RS=PS/TS
      RSD=RS*RIN
      IF(ABS(RS-RORIN)/RS-0.0001)402,402,403
  403 KIM=KIM+1
      IF(KIM-20)406,406,405
  406 RORIN=RSD/RIN
      GO TO 404
  405 WRITE(6,407)
  407 FORMAT(///27HERROR IN MAIN SHOCK DENSITY)
  402 CONTINUE
      CALL THERM(3,RORIN,ES,AS)
      RS=RORIN
      UCART=UNIN/RS
C
      RETURN
      END
C
C
```

```
      SUBROUTINE DISSS(RHOO,TT,DISS)
      DOUBLE PRECISION SUM
      COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
      DIMENSION DISS(10),WFOR(10),WBAK(10),A(20),B(20),G(10),ATWT(10)
      COMMON/INPUT1/COEF(2,7,10),Q(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/JANAF1/GRRT(10),HHH(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
      COMMON/INPUR1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
     1FRACT(10),IPR(20,6)
      COMMON/DISS1/WWW(10),DT
      EQUIVALENCE (A,COEFA),(B,COEFB),(G,GRRT),(ATWT,WMOL)
      DATA GAS1/82.07835/,GAS2/1.987/
  116 FORMAT(1H ,10X,10(A6,5X))
      RHO = RHOO* 32.2*454. / (12.*2.54)**3. * RIN
      RHO2=RHO * RHO
      RHO3=RHO2 * RHO
      T=TT*TIN/1.8
      DO 4001 I=1,NSPEC
      WFOR(I)= 0.0
 4001 WBAK(I)= 0.0
      DO 2001 JREACT=1,NREACT
      G1 = 0.0
      G2 = 0.0
      DO 11 I1=1,3
      IPR1D1=IPR(JREACT,I1)
      IPR2D1=IPR(JREACT,I1+3)
      IF(IPR1D1.NE. 0) G1=G(IPR1D1) + G1
      IF(IPR2D1 .NE. 0) G2=G(IPR2D1)  + G2
   11 CONTINUE
      AKPDUM=EXP(G1-G2)
       ITYPED=ITYPE(JREACT)
      GO TO(1111,2222,3333,4444,5555,6666),ITYPED
 1111 AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
      IPR1=IPR(JREACT,1)
      FA = DISS(IPR1)/ATWT(IPR1)
      IPR2=IPR(JREACT,2)
      FB = DISS(IPR2)/ATWT(IPR2)
      IPR4=IPR(JREACT,4)
      FC = DISS(IPR4)/ATWT(IPR4)
      IPR5=IPR(JREACT,5)
      FD = DISS(IPR5)/ATWT(IPR5)
      WWFOR = AKF * RHO2 * FA * FB
      WWBAK = AKF * RHO2 * FC * FD / AKPDUM
      GO TO 1001
 2222 AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
      IPR1=IPR(JREACT,1)
      FA = DISS(IPR1)/ATWT(IPR1)
      IPR2=IPR(JREACT,2)
      FB = DISS(IPR2)/ATWT(IPR2)
      IPR4=IPR(JREACT,4)
      FC=DISS(IPR4)/ATWT(IPR4)
      WWFOR = RHO3 * FA * FB * AKF / WSUM
      WWBAK = RHO2 * AKF / WSUM/ AKPDUM / GAS1 / T * FC
      GO TO 1001
 3333 AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
      IPR1=IPR(JREACT,1)
      FA = DISS(IPR1)/ATWT(IPR1)
      IPR2=IPR(JREACT,2)
      FB = DISS(IPR2)/ATWT(IPR2)
      IPR4 = IPR(JREACT,4)
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```
      FC = DISS(IPR4)/ATWT(IPR4)
      IPR5=IPR(JREACT,5)
      FD = DISS(IPR5)/ATWT(IPR5)
      IPR6 = IPR(JREACT,6)
      FE = DISS(IPR6)/ATWT(IPR6)
      WWFOR = RHO2 * AKF * FA * FB
      WWBAK = RHO3 * AKF * FC * FD * FE * GAS1 * T / AKPDUM
      GO TO 1001
 4444 AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
      IPR1=IPR(JREACT,1)
      FA = DISS(IPR1)/ATWT(IPR1)
      IPR2=IPR(JREACT,2)
      FB = DISS(IPR2)/ATWT(IPR2)
      IPR4 = IPR(JREACT,4)
      FC = DISS(IPR4)/ATWT(IPR4)
      WWFOR = RHO2 * AKF * FA * FB
      WWBAK = RHO * AKF * FC / GAS1 / T / AKPDUM
      GO TO 1001
 5555 AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
      IPR1=IPR(JREACT,1)
      FA = DISS(IPR1)/ATWT(IPR1)
      IPR4=IPR(JREACT,4)
      FB = DISS(IPR4)/ATWT(IPR4)
      IPR5=IPR(JREACT,5)
      FC = DISS(IPR5)/ATWT(IPR5)
      WWFOR = RHO2 * AKF * FA / WSUM
      WWBAK = RHO3 * AKF * FB * FC * GAS1 * T / AKPDUM / WSUM
      GO TO 1001
 6666 AKF=A(JREACT)*T**ETA(JREACT)*EXP(-B(JREACT)/T)
      IPR1=IPR(JREACT,1)
      FA = DISS(IPR1)/ATWT(IPR1)
      IPR2=IPR(JREACT,2)
      FB = DISS(IPR2)/ATWT(IPR2)
      IPR3=IPR(JREACT,3)
      FC = DISS(IPR3)/ATWT(IPR3)
      IPR4=IPR(JREACT,4)
      FD = DISS(IPR4)/ATWT(IPR4)
      IPR5=IPR(JREACT,5)
      FE = DISS(IPR5)/ATWT(IPR5)
      WWFOR=RHO3*AKF*FA*FB*FC*GAS1*T/AKPDUM
      WWBAK=RHO2*AKF*FD*FE
 1001 CONTINUE
      DO 3001 I=1,6
      JJ= IPR(JREACT,I)
      IF (JJ .EQ. 0) GO TO 3001
      IF (I .GE.4) WFOR(JJ)= WFOR(JJ)+ WWFOR
      IF (I .GE.4) WBAK(JJ)= WBAK(JJ)+ WWBAK
      IF (I .LE. 3) WFOR(JJ)= WFOR(JJ) + WWBAK
      IF (I .LE. 3) WBAK(JJ)= WBAK(JJ) + WWFOR
 3001 CONTINUE
 2001 CONTINUE
      DO 5001 I=1,NSPEC
      WWW(I)=(WFOR(I)-WBAK(I))*ATWT(I)/RHO*SQRT(RIN/PIN)
 5001 CONTINUE
C
      NS=NSPEC-1
      SUM=0.
      DO 1 I=1,NS
    1 SUM=SUM+WWW(I)
      WWW(NSPEC)=-SUM
```

```
RETURN
END
```

```
      SUBROUTINE TRANSP(T,P)
C                                                                      TRAN   2
C     CALCULATES GAS TRANSPORT PROPERTIES                              TRAN   3
C     MAXIMUM = 10 MOLECULES AND 10 REACTIONS
C     NUMBER OF MOLECULES = NM
C     NUMBER OF CHEMICAL REACTIONS = NR                                TRAN   7
C     ARRAY OF STOICHIOMETRIC COEFFICIENTS = STC                       TRAN   9
C     CROSS SECTION AND RELAXATION DATA = TABLES                       TRAN  14
C     VIBRATIONAL HEAT CAPACITY = CVIBR                                TRAN  13
C     MAXIMUM = 120 TABLES OF 20 TEMPERATURES EACH                     TRAN  15
C     IF CROSS SECTION DATA NTAB = 1 , IF RELAXATION DATA NTAB = 2     TRAN  16
C     VISCOSITY=ANS(1), MONATOMIC CONDUCTIVITY= ANS(2),                TRAN  17
C     INTERNAL CONDUCTIVITY=ANS(3), FROZEN CONDUCTIVITY=ANS(4),        TRAN  18
C     REACTION CONDUCTIVITY=ANS(5), EQUILIBRIUM CONDUCTIVITY=ANS(6),   TRAN  19
C     FROZEN CP=ANS(7), EQUILIBRIUM CP=ANS(8),                         TRAN  20
C     FROZEN PRANDTL NUMBER=ANS(9), EQUILIBRIUM PRANDTL NUMBER=ANS(10), TRAN 21
C     LEWIS NUMBER=ANS(11), MOLECULAR WEIGHT=ANS(12), DENSITY=ANS(13), TRAN  22
C     REACTION CP=ANS(14), ENTHALPY=ANS(15)                            TRAN  23
C                                                                      TRAN  24
      INTEGER SUB,SPECIE,SPECE,RELXTN                                  TRAN  26
      REAL MONCON,INTCON,LEWIS,LEWI
      LOGICAL FROZN
      DIMENSION ETA(10,10),DELH(10),CHECK(10)
      DIMENSION GMAT(10,11),RTPD(10,10),STXS(10,10),XSKL(10,10)
      COMMON/CONTRL/FROZN
      COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
      COMMON/DOUBLE/G(10,11),X(10),IMAT
      COMMON/INPUT1/COEF(2,7,10),Q(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/INPUT2/TEM(20,20),TABLES(20,20,3),SPECIE(20,2,3),ROTNM(10),
     1STC(10,10),SPECE(2,3),NTT(20),NTAB(20)
      COMMON/SORT1/OMEGA(10,10),ASTAR(10,10),BSTAR(10,10)
      COMMON/TRANS1/CPRR(10),HRRT(10),CVIBR(10),ROTM(10),RELXTN(10),
     1ANS(15),LEWI(10,10)
      COMMON /INTERP/ Z(20),Y(20,3),NTP,ANSR(3)
C                                                                      TRAN  61
      EQUIVALENCE (ANS(1) ,VISC  ), (ANS(2) ,MONCON), (ANS(3) ,INTCON) TRAN  62
      EQUIVALENCE (ANS(4) ,FRZCON), (ANS(5) ,REACON), (ANS(6) ,EQCON ) TRAN  63
      EQUIVALENCE (ANS(7) ,CPFROZ), (ANS(8) ,CPEQ  ), (ANS(9) ,PRFROZ) TRAN  64
      EQUIVALENCE (ANS(10),PREQ  ), (ANS(11),LEWIS ), (ANS(12),WTMOL ) TRAN  65
      EQUIVALENCE (ANS(13),DENSTY), (ANS(14),CPREAC), (ANS(15),ENTLPY) TRAN  66
      EQUIVALENCE (EQL,EQLB)                        , (RTPD,OMEGA)
      EQUIVALENCE (STXS,BSTAR)    , (XSKL,ETA)                         TRAN  68
C                                                                      TRAN  69
      DATA PI/3.14159265/,AVGDRO/6.022169/,BOLTZ/1.380622/             TRAN  70
      DATA RPVT/82.0562/,R/1.98726/
C                                                                      TRAN  73
      NAMELIST /MATRX/GMAT                                             TRAN  74
C     START TRANSPORT CALCULATIONS                                     TRAN 123
      NMM=NM
      NM=5
C                                                                      TRAN  75
      TT=T*TIN/1.8
      PP=P*PIN/14.7/144.
      CALL SORT1(TT)
C     CALCULATE VISCOSITY AND MONATOMIC THERMAL CONDUCTIVITY           TRAN 143
C                                                                      TRAN 144
      CONST = (5./16.)*SQRT(1.0E5*BOLTZ/(PI*AVGDRO))                   TRAN 145
      DO 24 I=1,15                                                     TRAN 146
   24 ANS(I)=0.0                                                       TRAN 147
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```
      DO 25 I=1,NM                                                      TRAN 148
      IF(XS(I).LT.1.E-8)XS(I)=1.E-8
      DO 25 J=I,NM                                                      TRAN 149
      ETA(I,J)= CONST*SQRT(2.0*WMOL(I)*WMOL(J)*TT/(WMOL(I)+WMOL(J)))/   TRAN 150
     1 OMEGA(I,J)                                                       TRAN 151
   25 ETA(J,I)=ETA(I,J)                                                 TRAN 152
      DO 27 I=1,NM                                                      TRAN 153
      DO 27 J=I,NM                                                      TRAN 154
      IF(I-J) 29,28,29                                                  TRAN 155
   28 SUM=0.0                                                           TRAN 156
      DO 30 K=1,NM                                                      TRAN 157
      IF(K-I) 31,30,31                                                  TRAN 158
   31 SUM=2.0*XS(I)*XS(K)*WMOL(I)*WMOL(K)*((5./3.)/ASTAR(I,K)+WMOL(K)/  TRAN 159
     1 WMOL(I))/(ETA(I,K)*(WMOL(I)+WMOL(K))**2)+SUM                     TRAN 160
   30 CONTINUE                                                          TRAN 161
      G(I,J)=XS(I)**2/ETA(I,I)+SUM                                      TRAN 162
      GO TO 27                                                          TRAN 163
   29 G(I,J)=-2.0*XS(I)*XS(J)*WMOL(I)*WMOL(J)*((5./3.)/ASTAR(I,J)-1.0)/ TRAN 164
     1 (ETA(I,J)*(WMOL(I)+WMOL(J))**2)                                  TRAN 165
      G(J,I)=G(I,J)                                                     TRAN 166
   27 CONTINUE                                                          TRAN 167
      K=NM+1                                                            TRAN 168
      DO 32 I=1,NM                                                      TRAN 169
   32 G(I,K)=XS(I)                                                      TRAN 170
      DO 33 I=1,NM                                                      TRAN 172
      DO 33 J=1,K                                                       TRAN 173
   33 GMAT(I,J)=G(I,J)                                                  TRAN 174
      IMAT=NM
      CALL GAUSS                                                        TRAN 175
      DO 34 I=1,NM                                                      TRAN 176
      CHECK(I)=0.0                                                      TRAN 177
      DO 35 J=1,NM                                                      TRAN 178
   35 CHECK(I)=CHECK(I)+X(J)*GMAT(I,J)                                  TRAN 179
      IF(ABS((CHECK(I)-XS(I))/XS(I))-0.0001) 34,36,36                   TRAN 180
   36 WRITE(6,37) NM,I,CHECK(I),XS(I)                                   TRAN 181
   37 FORMAT(1H1,31X,48HERROR IN GAUSS SOLUTION IN CALCULATING VISCOSITYTRAN 182
     1//3X,10HTHERE ARE  I2,45H EQUATIONS AND THERE IS AN ERROR IN EQUATTRAN 183
     2ION  I2,26H THE CALCULATED ANSWER IS  F10.7,12H INSTEAD OF  F10.7 TRAN 184
     3//50X,19HTHE MATRIX ARRAY IS/)                                    TRAN 185
      WRITE(6,MATRX)                                                    TRAN 186
   34 CONTINUE                                                          TRAN 187
      DO 39 I=1,NM                                                      TRAN 188
   39 VISC=VISC+XS(I)*X(I)                                              TRAN 189
C                                                                       TRAN 190
      DO 40 I=1,NM                                                      TRAN 191
      DO 40 J=I,NM                                                      TRAN 192
      IF(I-J) 42,41,42                                                  TRAN 193
   41 SUM=0.0                                                           TRAN 194
      DO 43 K=1,NM                                                      TRAN 195
      IF(K-I) 44,43,44                                                  TRAN 196
   44 SUM=16.0*XS(I)*XS(K)*(7.5*WMOL(I)**2+6.25*WMOL(K)**2-3.0*         TRAN 197
     1 WMOL(K)**2*BSTAR(I,K)+4.0*WMOL(I)*WMOL(K)*ASTAR(I,K))*WMOL(I)*   TRAN 198
     2 WMOL(K)/(15.0*R*(WMOL(I)+WMOL(K))**3*ASTAR(I,K)*ETA(I,K))+SUM    TRAN 199
   43 CONTINUE                                                          TRAN 200
      G(I,J)=16.0*XS(I)**2*WMOL(I)/(15.0*R*ETA(I,I))+SUM                TRAN 201
      GO TO 40                                                          TRAN 202
   42 G(I,J)=-16.0*XS(I)*XS(J)*WMOL(I)**2*WMOL(J)**2*(13.75-3.0*        TRAN 203
     1 BSTAR(I,J)-4.0*ASTAR(I,J))/(15.0*R*(WMOL(I)+WMOL(J))**3          TRAN 204
     2 *ASTAR(I,J)*ETA(I,J))                                            TRAN 205
      G(J,I)=G(I,J)                                                     TRAN 206
```

```
   40 CONTINUE                                                          TRAN 207
      K=NM+1                                                            TRAN 208
      DO 45 I=1,NM                                                      TRAN 209
   45 G(I,K)=XS(I)                                                      TRAN 210
      CALL GAUSS                                                        TRAN 211
      DO 47 I=1,NM                                                      TRAN 212
   47 MONCON=MONCON+4.0*XS(I)*X(I)                                      TRAN 213
C                                                                       TRAN 214
C     CALCULATE INTERNAL THERMAL CONDUCTIVITY                           TRAN 215
C                                                                       TRAN 216
      DO 104 I=1,NM                                                     TRAN 217
      IF(CVIBR(I).EQ.0.0) CVIBR(I) = CPRR(I)-(2.5+0.5*ROTM(I))          TRAN 218
      RELXTN(I)=0.0                                                     TRAN 219
  104 CONTINUE                                                          TRAN 222
      DO 53 I=1,NM                                                      TRAN 223
      IF(CPRR(I).EQ.2.5) GO TO 53                                       TRAN 224
      SUM=0.0                                                           TRAN 225
      DO 54 K=1,NM                                                      TRAN 226
      IF(K-I) 55,54,55                                                  TRAN 227
   55 SUM=SUM+ASTAR(I,I)*ETA(I,I)*XS(K)*2.0*WMOL(K)/(ASTAR(I,K)*        TRAN 228
     1 ETA(I,K)*XS(I)*(WMOL(I)+WMOL(K)))                                TRAN 229
   54 CONTINUE                                                          TRAN 230
      INTCON=INTCON+(1.2*ASTAR(I,I)*(CPRR(I)-2.5)-RELXTN(I)*            TRAN 231
     1 (2.5-1.2*ASTAR(I,I))**2/(0.5*PI+RELXTN(I)*(5.0/3.0+1.2*          TRAN 232
     2 ASTAR(I,I)/(CPRR(I)-2.5))))*R*ETA(I,I)/WMOL(I)/(1.0+SUM)         TRAN 233
   53 CONTINUE                                                          TRAN 234
      IF(NR.EQ.0) GO TO 91                                              TRAN 235
      IF(FROZN) GO TO 91                                                TRAN 236
C                                                                       TRAN 237
C     CALCULATE REACTION HEAT CAPACITY AND THERMAL CONDUCTIVITY         TRAN 238
C                                                                       TRAN 239
      L=1+NR                                                            TRAN 240
      DO 64 I=1,NR                                                      TRAN 241
      DO 64 J=1,L                                                       TRAN 242
      GMAT(I,J)=0.0                                                     TRAN 243
   64 G(I,J)=0.0                                                        TRAN 244
      DO 65 I=1,NR                                                      TRAN 245
      DELH(I)=0.0                                                       TRAN 246
      DO 66 K=1,NM                                                      TRAN 247
   66 DELH(I)=STC(I,K)*HRRT(K)+DELH(I)                                  TRAN 248
   65 G(I,L)=DELH(I)                                                    TRAN 249
      DO 99 K=1,NM                                                      TRAN 250
      DO 99 L=K,NM                                                      TRAN 251
      RTPD(K,L)= 5.0*WMOL(K)*WMOL(L)/                                   TRAN 252
     1 (3.0*ASTAR(K,L)*ETA(K,L)*(WMOL(K)+WMOL(L)))                      TRAN 253
      XSKL(K,L) = 1.0/(XS(K)*XS(L))                                     TRAN 254
      XSKL(L,K) = XSKL(K,L)                                             TRAN 255
   99 RTPD(L,K) = RTPD(K,L)                                             TRAN 256
      DO 98 I=1,10
      DO 98 J=1,10
   98 IF (ABS(STC(I,J)).LT.1.0E-6)  STC(I,J) = 0.0                      TRAN 259
      JJ=NM-1                                                           TRAN 260
      DO 67 I=1,NR                                                      TRAN 261
      DO 67 J=I,NR                                                      TRAN 262
      DO 68 K=1,JJ                                                      TRAN 263
      LL=K+1                                                            TRAN 264
      DO 68 L=LL,NM                                                     TRAN 265
      STXS(K,L) = 0.0                                                   TRAN 266
      IF ((STC(I,K).EQ.0.0).AND.(STC(I,L).EQ.0.0))  GO TO 68            TRAN 267
      IF ((STC(J,K).EQ.0.0).AND.(STC(J,L).EQ.0.0))  GO TO 68            TRAN 268
```

```
      STXS(K,L) = XSKL(K,L)*                                            TRAN 269
     1 (XS(L)*STC(I,K)-XS(K)*STC(I,L))*                                 TRAN 270
     2 (XS(L)*STC(J,K)-XS(K)*STC(J,L))                                  TRAN 271
      G(I,J) = G(I,J)+STXS(K,L)                                         TRAN 272
      GMAT(I,J) = GMAT(I,J)+RTPD(K,L)*STXS(K,L)                         TRAN 273
   68 CONTINUE                                                          TRAN 274
      GMAT(J,I) = GMAT(I,J)                                             TRAN 275
   67 G(J,I)=G(I,J)                                                     TRAN 276
      IMAT=NR                                                           TRAN 277
      CALL GAUSS                                                        TRAN 278
      DO 101 I=1,NR                                                     TRAN 279
  101 CPREAC=CPREAC+R*DELH(I)*X(I)                                      TRAN 280
C                                                                       TRAN 281
      L=1+NR                                                            TRAN 282
      DO 56 I=1,NR                                                      TRAN 283
      DO 56 J=1,L                                                       TRAN 284
   56 G(I,J)=0.0                                                        TRAN 285
      DO 57 I=1,NR                                                      TRAN 286
   57 G(I,L)=DELH(I)                                                    TRAN 287
      JJ=NM-1                                                           TRAN 288
      DO 59 I=1,NR                                                      TRAN 289
      DO 59 J=I,NR                                                      TRAN 290
      G(I,J) = GMAT(I,J)                                                TRAN 291
   59 G(J,I)=G(I,J)                                                     TRAN 292
      CALL GAUSS                                                        TRAN 293
      DO 70 I=1,NR                                                      TRAN 294
      CHECK(I)=0.0                                                      TRAN 295
      DO 71 J=1,NR                                                      TRAN 296
   71 CHECK(I)=CHECK(I)+X(J)*GMAT(I,J)                                  TRAN 297
      IF(ABS((CHECK(I)-DELH(I))/DELH(I))-0.010) 70,72,72                TRAN 298
   72 WRITE(6,73) NR,I,CHECK(I),DELH(I)                                 TRAN 299
   73 FORMAT(1H1,31X,68HERROR IN GAUSS SOLUTION IN CALCULATING REACTION TRAN 300
     1THERMAL CONDUCTIVITY//3X,10HTHERE ARE I2,45H EQUATIONS AND THERE ITRAN 301
     2S AN ERROR IN EQUATION I2,26H THE CALCULATED ANSWER IS F10.7,     TRAN 302
     312H INSTEAD OF F10.7//50X,19HTHE MATRIX ARRAY IS/)                TRAN 303
      WRITE(6,MATRX)                                                    TRAN 304
   70 CONTINUE                                                          TRAN 305
      DO 75 I=1,NR                                                      TRAN 306
   75 REACON=REACON+R*DELH(I)*X(I)                                      TRAN 307
C                                                                       TRAN 308
C     CALCULATE MULTICOMPONENT DIFFUSION COEFFICIENT
C
   91 CONTINUE
      DO 211 I=1,NM
      SUM=0.
      DO 212 K=1,NM
      IF(K.NE.I)SUM=SUM+XS(K)*RTPD(I,K)
  212 CONTINUE
      DO 211 J=1,NM
      G(I,J)=XS(I)*RTPD(I,J)+WMOL(J)/WMOL(I)*SUM
      IF(I.EQ.J)G(I,J)=0.
  211 CONTINUE
C
      ANSR(1)=1.
      CALL GJR(G,11,10,NM,NM,$105,RELXTN,ANSR)
C
      DO 221 I=1,NM
      DO 221 J=1,NM
  221 RTPD(I,J)=(G(J,I)-G(I,I))/WMOL(J)
C     CALCULATE OTHER ANSWERS                                           TRAN 369
```

```
C                                                                       TRAN 310
      FRZCON=MONCON+INTCON
      EQCON=FRZCON+REACON                                               TRAN 312
      DO 102 I=1,NM                                                     TRAN 313
      CPFROZ=CPFROZ+XS(I)*CPRR(I)                                       TRAN 314
      ENTLPY=ENTLPY+XS(I)*HRRT(I)                                       TRAN 315
  102 WTMOL=WTMOL+XS(I)*WMOL(I)                                         TRAN 316
      CPFROZ=CPFROZ*R/WTMOL                                             TRAN 317
      CPREAC=CPREAC/WTMOL                                               TRAN 318
      CPEQ=CPREAC+CPFROZ                                                TRAN 319
      ENTLPY=R*TT*ENTLPY/WTMOL                                          TRAN 320
      PRFROZ=VISC*CPFROZ/FRZCON                                         TRAN 321
      PREQ=VISC*CPEQ/EQCON                                              TRAN 322
      DENSTY=(WTMOL*PP)/(RPVT*TT)                                       TRAN 323
      DO 1111 I=1,NM
      DO 1111 J=1,NM
      LEWI(I,J)=CPFROZ*RTPD(I,J)*WTMOL**2/FRZCON
 1111 CONTINUE
      IF(FROZN.OR.NR.EQ.0) GO TO 105                                    TRAN 324
      LEWIS=(REACON*CPFROZ)/(FRZCON*CPREAC)                             TRAN 325
  105 CONTINUE                                                          TRAN 326
      NM=NMM
C                                                                       TRAN 329
      RETURN
      END                                                               TRAN 332
      DOUBLE PRECISION G,X,GMAT,CHECK                                   TRAN  25
      CALL OUT(TT,PP)
C
C
```

```
      SUBROUTINE SORT
C                                                                      TRAN  58
C     BRINGS IN AND SORTS OUT INPUT FOR TRANSPORT CALCULATIONS         INPT   3
C                                                                      INPT   2
      COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/INPUT2/TEM(20,20),TABLES(20,20,3),SPECIE(20,2,3),ROTNM(10),
     1STC(10,10),SPECE(2,3),NTT(20),NTAB(20)
      COMMON/SORT1/OMEGA(10,10),ASTAR(10,10),BSTAR(10,10)
      DIMENSION D(2),W(60),V(2),NT(5,5),TE(20,5,5),TAB(20,3,5,5),
     1  COE(60,3,5,5)
      DATA MAXNM/20/,ND/4HLAST/,NBLANK/1H /                            INPT  48
C                                                                      TRAN 122
C     FIND TRANSPORT AND RELAXATON DATA FOR IMPORTANT INTERACTIONS     INPT 138
C                                                                      INPT 139
      NK=0                                                             INPT 148
   18 NK=NK+1                                                          INPT 149
      IF(SPECIE(NK,1,1).EQ.ND) GO TO 22                                INPT 150
      K=1                                                              INPT 151
   14 DO 16 L=1,NM                                                     INPT 152
      J=L
      DO 15 I=1,3                                                      INPT 154
      IF(SPECIE(NK,K,I).NE.SUB(J,I)) GO TO 16                          INPT 155
   15 CONTINUE                                                         INPT 156
      IF(K.EQ.2) GO TO 20                                              INPT 157
      M=L                                                              INPT 158
      GO TO 17                                                         INPT 159
   16 CONTINUE                                                         INPT 160
      GO TO 18                                                         INPT 161
   17 JJ=J                                                             INPT 162
      DO 19 I=1,3                                                      INPT 163
      IF(SPECIE(NK,2,I).NE.SUB(J,I)) GO TO 24                          INPT 164
   19 CONTINUE                                                         INPT 165
      GO TO 20                                                         INPT 166
   24 K=2                                                              INPT 167
      GO TO 14                                                         INPT 168
   20 NTP=NTT(NK)                                                      INPT 169
      NT(L,M)=NTT(NK)
      DO 39 I=1,NTP                                                    INPT 170
      TE(I,L,M)=TEM(NK,I)
      DO 39 J=1,3                                                      INPT 172
      TAB(I,J,L,M)=TABLES(NK,I,J)
   39 CONTINUE                                                         INPT 174
      DO 49 J=1,3
      CALL SPLN1(NT(L,M),TE(1,L,M),TAB(1,J,L,M),2,D,COE(1,J,L,M),W)
   49 CONTINUE
      GO TO 18                                                         INPT 190
   22 CONTINUE
      RETURN
      ENTRY SORT1(TT)
      DO 9 I=1,NM                                                      INPT 140
      DO 9 J=1,NM                                                      INPT 145
      OMEGA(I,J)=0.0                                                   INPT 146
    9 CONTINUE                                                         INPT 147
      V(1)=TT
      DO 1 L=1,NM
      DO 1 M=L,NM
      DO 2 J=1,3
      CALL SPLN2(NT(L,M),TE(1,L,M),TAB(1,J,L,M),COE(1,J,L,M),V)
      IF(J.EQ.1)OMEGA(L,M)=V(2)
```

```
      IF(J.EQ.2)ASTAR(L,M)=V(2)
      IF(J.EQ.3)BSTAR(L,M)=V(2)
    2 CONTINUE
      OMEGA(M,L)=OMEGA(L,M)                                          INPT 187
      ASTAR(M,L)=ASTAR(L,M)                                          INPT 188
      BSTAR(M,L)=BSTAR(L,M)                                          INPT 189
    1 CONTINUE
C                                                                    INPT 191
C     MAKE ESTIMATES FOR MISSING DATA                                INPT 192
C                                                                    INPT 193
      DO 27 I=1,NM
      IF(OMEGA(I,I).GT.0) GO TO 27
      K=I
      IF(XS(I).LT.5.0E-6) GO TO 36                                   INPT 197
   36 CONTINUE                                                       INPT 201
      OMEGA(I,I) = ALOG (320.*WMOL(I)**4/TT**1.4)                    INPT 202
      IF (OMEGA(I,I).LT.1.) OMEGA(I,I) = 1.                          INPT 203
      ASTAR(I,I)=1.0                                                 INPT 204
      BSTAR(I,I)=1.0                                                 INPT 205
   27 CONTINUE                                                       INPT 206
      NMM=NM-1                                                       INPT 207
      DO 23 I=1,NMM                                                  INPT 208
      K=I+1                                                          INPT 209
      DO 23 J=K,NM                                                   INPT 210
      IF(OMEGA(I,J).GT.0) GO TO 26
      OMEGA(I,J)=(OMEGA(I,I)+OMEGA(J,J)+2.*SQRT(OMEGA(I,I)*OMEGA(J,J))) INPT 212
     1/4.0                                                           INPT 213
      ASTAR(I,J)=(ASTAR(I,I)+ASTAR(J,J))/2.                          INPT 214
      BSTAR(I,J)=(BSTAR(I,I)+BSTAR(J,J))/2.                          INPT 215
   26 OMEGA(J,I)=OMEGA(I,J)                                          INPT 216
      ASTAR(J,I)=ASTAR(I,J)                                          INPT 217
      BSTAR(J,I)=BSTAR(I,J)                                          INPT 218
   23 CONTINUE                                                       INPT 219
      RETURN                                                         INPT 273
      END                                                            INPT 274
      WRITE(6,28) (SUB(K,L),L=1,3)                                   INPT 199
   28 FORMAT(1H0,40X,44HNO TRANSPORT DATA WAS FOUND FOR THE SPECIES 3A4)INPT 200
  114 FORMAT(50(/20X,2(3A4,6X)))
      WRITE(6,114)((SUB(I,J),J=1,3),I=1,NM)
      WRITE(6,120)NTP
  120 FORMAT(  )
      WRITE(6,116)(Z(I),(Y(I,J),J=1,3),I=1,NTP)
  116 FORMAT(1X,4F10.4)
      WRITE(6,114)(((SPECIE(N,I,J),J=1,3),I=1,2),N=1,NK)
C
      RETURN
      END
      COMMON /INTERP/ Z(20),Y(20,3),NTP,ANSR(3)
```

```
      SUBROUTINE SPLN1 (N,X,Y,J,D,C,W)                                  SPLN1
      DIMENSION X(1),Y(1),D(2),C(1),W(1)                                SPLN1
C     ------------------------------------------------------------------SPLN1
C             OVER THE INTERVAL X(I) TO X(I+1), THE INTERPOLATING       SPLN1
C             POLYNOMIAL                                                SPLN1
C                  Y=Y(I)+A(I)*Z+B(I)*Z**2+E(I)*Z**3                    SPLN1
C             WHERE Z=(X-X(I))/(X(I+1)-X(I))                            SPLN1
C             IS USED. THE COEFFICIENTS A(I),B(I) AND E(I) ARE COMPUTED SPLN1
C             BY SPLN1 AND STORED IN LOCATIONS C(3*I-2),C(3*I-1) AND    SPLN1
C             C(3*I) RESPECTIVELY.                                      SPLN1
C             WHILE WORKING IN THE ITH INTERVAL,THE VARIABLE Q WILL      SPLN1
C             REPRESENT Q=X(I+1) - X(I), AND Y(I) WILL REPRESENT        SPLN1
C             Y(I+1)-Y(I)                                               SPLN1
C     ------------------------------------------------------------------SPLN1
C                                                                       SPLN1
      Q=X(2) - X(1)                                                     SPLN1
      YI =Y(2) - Y(1)                                                   SPLN1
      IF (J.EQ.2) GO TO 100                                             SPLN1
C     ------------------------------------------------------------------SPLN1
C             IF THE FIRST DERIVATIVE AT THE END POINTS IS GIVEN,       SPLN1
C             A(1) IS KNOWN, AND THE SECOND EQUATION BECOMES            SPLN1
C             MERELY B(1)+E(1)=YI - Q*D(1).                             SPLN1
C     ------------------------------------------------------------------SPLN1
      C(1)=Q*D(1)                                                       SPLN1
      C(2)=1.0                                                          SPLN1
      W(2)=YI-C(1)                                                      SPLN1
      GO TO 200                                                         SPLN1
C     ------------------------------------------------------------------SPLN1
C             IF THE SECOND DERIVATIVE AT THE END POINTS IS GIVEN       SPLN1
C             B(1) IS KNOWN, THE SECOND EQUATION BECOMES                SPLN1
C             A(1)+E(1)=YI-0.5*Q*Q*D(1). DURING THE SOLUTION OF         SPLN1
C             THE 3N-4 EQUATIONS,A1 WILL BE KEPT IN CELL C(2)           SPLN1
C             INSTEAD OF C(1) TO RETAIN THE TRIDIAGONAL FORM OF THE     SPLN1
C             COEFFICIENT MATRIX.                                       SPLN1
C     ------------------------------------------------------------------SPLN1
100   C(2)=0.0                                                          SPLN1
      W(2)=0.5*Q*Q*D(1)                                                 SPLN1
200   M=N-2                                                             SPLN1
      IF(M.LE.0) GO TO 350                                              SPLN1
C     ------------------------------------------------------------------SPLN1
C             UPPER TRIANGULARIZATION OF THE TRIDIAGONAL SYSTEM OF      SPLN1
C             EQUATIONS FOR THE COEFFICIENT MATRIX FOLLOWS--            SPLN1
C     ------------------------------------------------------------------SPLN1
      DO 300 I=1,M                                                      SPLN1
      AI=Q                                                              SPLN1
      Q=X(I+2)- X(I+1)                                                  SPLN1
      H=AI/Q                                                            SPLN1
      C(3*I)=-H/(2.0-C(3*I-1))                                          SPLN1
      W(3*I)=(-YI-W(3*I-1))/(2.0 - C(3*I-1))                            SPLN1
      C(3*I+1)=-H*H/(H-C(3*I))                                          SPLN1
      W(3*I+1)=(YI-W(3*I))/(H-C(3*I))                                   SPLN1
      YI=Y(I+2)- Y(I+1)                                                 SPLN1
      C(3*I+2)=1.0/(1.0-C(3*I+1))                                       SPLN1
300   W(3*I+2)=(YI-W(3*I+1))/(1.0-C(3*I+1))                             SPLN1
C     ------------------------------------------------------------------SPLN1
C             E(N-1) IS DETERMINED DIRECTLY FROM THE LAST EQUATION      SPLN1
C             OBTAINED ABOVE, AND THE FIRST OR SECOND DERIVATIVE        SPLN1
C             VALUE GIVEN AT THE END POINT.                             SPLN1
C     ------------------------------------------------------------------SPLN1
350   IF(J.EQ.1) GO TO 400                                              SPLN1
```

```
      C(3*N-3)=(Q*Q*D(2)/2.0-W(3*N-4))/(3.0- C(3*N-4))                  SPLN1
      GO TO 500                                                         SPLN1
  400 C(3*N-3)=(Q*D(2)-YI-W(3*N-4))/(2.0-C(3*N-4))                      SPLN1
  500 M=3*N-6                                                           SPLN1
      IF(M.LE.0) GO TO 700                                              SPLN1
C     ------------------------------------------------------------------SPLN1
C             BACK SOLUTION FOR ALL COEFFICENTS EXCEPT                  SPLN1
C             A(1) AND B(1) FOLLOWS--                                   SPLN1
C     ------------------------------------------------------------------SPLN1
      DO 600 II=1,M                                                     SPLN1
      I=M-II+3                                                          SPLN1
  600 C(I)=W(I)-C(I)*C(I+1)                                             SPLN1
  700 IF(J.EQ.1) GO TO 800                                              SPLN1
C     ------------------------------------------------------------------SPLN1
C             IF THE SECOND DERIVATIVE IS GIVEN AT THE END POINTS,      SPLN1
C             A(1) CAN NOW BE COMPUTED FROM THE KNOWN VALUES OF         SPLN1
C             B(1) AND E(1). THEN A(1) AND B(1) ARE PUT INTO THEIR      SPLN1
C             PROPER PLACES IN THE C ARRAY.                             SPLN1
C     ------------------------------------------------------------------SPLN1
      C(1)=Y(2) - Y(1)-W(2)-C(3)                                        SPLN1
      C(2)=W(2)                                                         SPLN1
      RETURN                                                            SPLN1
  800 C(2)=W(2)-C(3)                                                    SPLN1
      RETURN                                                            SPLN1
      END                                                               SPLN1
```

```
      SUBROUTINE SPLN2 (N,X,Y,C,V)
      DIMENSION X(1),Y(1),C(1),V(5)
      V(5)=2.0
      LIM=N-1
C                 ------------------------------------------------------
C                 DETERMINE IN WHICH INTERVAL THE INDEPENDENT
C                 VARIABLE,V(1),LIES.
C                 ------------------------------------------------------
      DO 10 I=2,LIM
   10 IF(V(1).LT.X(I)) GO TO 20
      I=N
      IF(V(1).GT.X(N)) V(5)=3.0
      GO TO 30
   20 IF(V(1).LT.X(1)) V(5) =1.0
C                 ------------------------------------------------------
C                 Q IS THE SIZE OF THE INTERVAL CONTAINING V(1).
C                 ------------------------------------------------------
C                 Z IS A LINEAR TRANSFORMATION OF THE INTERVAL
C                 ONTO (0,1) AND IS THE VARIABLE FOR WHICH
C                 THE COEFFICIENTS WERE COMPUTED BY SPLN1.
C                 ------------------------------------------------------
   30 Q=X(I)-X(I-1)
      Z=(V(1)-X(I-1))/Q
      V(2)=((Z*C(3*I-3)+C(3*I-4))*Z+C(3*I-5))*Z+Y(I-1)
      RETURN
      END
```

```
      SUBROUTINE GAUSS                                                  GAUS   1
C                                                                       GAUS   2
C     SOLVE ANY LINEAR SET OF UP TO 20 EQUATIONS                        GAUS   3
C     NUMBER OF EQUATIONS = IMAT                                        GAUS   4
C                                                                       GAUS   5
      DIMENSION COEFX(20)
C                                                                       GAUS   7
      COMMON/DOUBLE/G(10,11),X(10),IMAT
C                                                                       GAUS  13
      DATA BIGNO/1.E+38/                                                GAUS  14
C                                                                       GAUS  15
C     BEGIN ELIMINATION OF NNTH VARIABLE                                GAUS  16
C                                                                       GAUS  17
      IUSE1 = IMAT+1                                                    GAUS  18
    6 DO 45  NN=1,IMAT                                                  GAUS  19
      IF(NN-IMAT)  8,83,8                                               GAUS  20
   83 IF(G(NN,NN)) 31,23,31                                             GAUS  21
C                                                                       GAUS  22
C     SEARCH FOR MAXIMUM COEFFICIENT IN EACH ROW                        GAUS  23
C                                                                       GAUS  24
    8 DO 18  I=NN,IMAT                                                  GAUS  25
      COEFX(I) = BIGNO                                                  GAUS  26
      IF(G(I,NN).EQ.0.)  GO TO 18                                       GAUS  27
      COEFX(I) = 0.                                                     GAUS  28
      DO 10 J=NN,IUSE1                                                  GAUS  29
      SUM = G(I,J)                                                      GAUS  30
      IF(SUM.LT.0.)  SUM=-SUM                                           GAUS  31
      IF(J.NE.NN)  GO TO 9                                              GAUS  32
      Z = SUM                                                           GAUS  33
      GO TO 10                                                          GAUS  34
    9 IF(SUM.GT.COEFX(I))  COEFX(I)=SUM                                 GAUS  35
   10 CONTINUE                                                          GAUS  36
      COEFX(I) = COEFX(I)/Z                                             GAUS  37
   18 CONTINUE                                                          GAUS  38
C                                                                       GAUS  39
C     LOCATE ROW WITH SMALLEST MAXIMUM COEFFICIENT                      GAUS  40
C                                                                       GAUS  41
      TEMP = BIGNO                                                      GAUS  42
      I=0                                                               GAUS  43
   20 DO 22  J=NN,IMAT                                                  GAUS  44
      IF (COEFX(J)-TEMP) 87,22,22                                       GAUS  45
   87 TEMP=COEFX(J)                                                     GAUS  46
      I=J                                                               GAUS  47
   22 CONTINUE                                                          GAUS  48
      IF(I) 28,23,28                                                    GAUS  49
C                                                                       GAUS  50
C     INDEX I LOCATES EQUATION TO BE USED FOR ELIMINATING THE NTH       GAUS  51
C     VARIABLE FROM THE REMAINING EQUATIONS                             GAUS  52
C                                                                       GAUS  53
C     INTERCHANGE EQUATIONS I AND NN                                    GAUS  54
C                                                                       GAUS  55
   28 IF(NN-I) 29,31,29                                                 GAUS  56
   29 DO 30 J=NN,IUSE1                                                  GAUS  57
      Z=G(I,J)                                                          GAUS  58
      G(I,J)=G(NN,J)                                                    GAUS  59
      G(NN,J)=Z                                                         GAUS  60
   30 CONTINUE                                                          GAUS  61
C                                                                       GAUS  62
C     DIVIDE NTH ROW BY NTH DIAGONAL ELEMENT AND ELIMINATE THE NTH      GAUS  63
C     VARIABLE FROM THE REMAINING EQUATIONS                             GAUS  64
```

```
C                                                                       GAUS  65
   31 K = NN + 1                                                        GAUS  66
      DO 36 J = K, IUSE1                                                GAUS  67
      IF(G(NN,NN).EQ.0.)  GO TO 23                                      GAUS  68
      G(NN,J) = G(NN,J) / G(NN,NN)                                      GAUS  69
   36 CONTINUE                                                          GAUS  70
      IF(K-IUSE1) 88,45,88                                              GAUS  71
   88 DO 44   I=K,IMAT                                                  GAUS  72
   40 DO 44 J = K,IUSE1                                                 GAUS  73
      G(I,J) = G(I,J) - G(I,NN)*G(NN,J)                                 GAUS  74
   44 CONTINUE                                                          GAUS  75
   45 CONTINUE                                                          GAUS  76
C                                                                       GAUS  77
C     BACKSOLVE FOR THE VARIABLES                                       GAUS  78
C                                                                       GAUS  79
      K = IMAT                                                          GAUS  80
   47 J = K + 1                                                         GAUS  81
      X(K) = 0.0D0                                                      GAUS  82
      SUM = 0.0                                                         GAUS  83
      IF(IMAT-J)  51,48,48                                              GAUS  84
   48 DO 50  I=J,IMAT                                                   GAUS  85
      SUM = SUM + G(K,I)* X(I)                                          GAUS  86
   50 CONTINUE                                                          GAUS  87
   51 X(K) = G(K,IUSE1) - SUM                                           GAUS  88
      K = K - 1                                                         GAUS  89
      IF(K) 47,151,47                                                   GAUS  90
   23 IMAT = IMAT-1                                                     GAUS  91
  151 RETURN                                                            GAUS  92
      END                                                               GAUS  93
      DOUBLE PRECISION G,X,COEFX(20),SUM,Z                              GAUS   6
C
```

```
      SUBROUTINE OUTPUT
C
      INCLUDE PROC,LIST
      DIMENSION DISS(10),ANAME(10),ATWT(10)
      COMMON/INPUT1/COEF(2,7,10),U(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/INPUR1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
     1FRACT(10),IPR(20,6)
      COMMON/JANAF1/GRRT(10),HHH(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
      COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
      EQUIVALENCE (ANAME,SUB(1,1)),(ATWT,WMOL)
      EQUIVALENCE (DISS, UJ(5))
C
  100 FORMAT(1H1)
  101 FORMAT(1HO,9H AT LINE ,I10/10X,1HP,12X,1HT,12X,3HRHO,12X,1HU,12X,1
     1HV,11X,1HE,12X,1HM,13X,1HZ,7X,2HCF,7X,2HCH)
  102 FORMAT(I3,8E13.5,2X,2E9.4)
  103 FORMAT(1H1,8H AT STEP,I10,15X,5H DT1=E16.7,3X,5H DT2=E16.7,3X,
     1      5HAT N=I3,4H, M=I3,/,50X,5HTIME=E16.7/1HO)
  104 FORMAT(35X,5HY     ,5X,14HSHOCK VELOCITY,9X,2HSY,12X,2HZS,15X,2HYS)
  106 FORMAT(I27,5E15.5)
  111 FORMAT(1HO,9H AT LINE ,I10/10X,1HP,12X,1HT,12X,3HRHO,12X,1HU,12X,1
     1HV,11X,1HE,12X,1HM,13X,1HZ,7X,6HDHSTAG)
  116 FORMAT(1H,10X,10(A6,6X))
 117  FORMAT(1H ,10(3X,E10.5))
C
      WRITE(6,103)K,DT1,DT2,N1,M1,TIME
      WRITE(6,104)
      DO 35 M=2,MC
      DUM2=XI(M)
   35 WRITE(6,106)M,DUM2,ST(M),PSI(M),ZS(M),YS(M)
      DO 50 N=2,NC
      IF(N.NE.NC)WRITE(6,111)N
      IF(N.EQ.NC)WRITE(6,101)N
      WRITE(6,116)(ANAME(I),I=1,NSPEC)
      DO 50 M=2,MC
      H1=HH1(N,M)
      H2=HH2(N,M)
      H3=HH3(N,M)
      H12=H1*H2
      H123=H12
      CALL CONVR2(N,M)
      CALL TRANSC(N,M)
      IF(N.EQ.NC)CALL DIFFUS(N,M)
      IF(N.EQ.NC)CALL HEAT(N,M)
      IF(N.EQ.NC)CALL STRESS(N,M)
      A2=A(N,M)*A(N,M)
      DUM=SQRT((U2*U2+U3*U3)/A2)
      PP=P(N,M)
      HH=0.
      DO 33 I=1,NSPEC
   33 HH=HH+DISS(I)*HHH(I)/ATWT(I)
      HH=U4*PIN/RIN+PP*PIN/U1/RIN
      DHSTAG=1.-HH/(HIN+U0**2./2.)
      DAM=S(M)*(1.-NU(N))
      TT=T(N,M)
      IF(N.EQ.NC)CF=PI12/(0.5*GAMMA*ACH**2.)
      IF(N.EQ.NC)CH=Q2/((HIN+U0**2.-HH)/PIN*RIN)/SQRT(GAMMA)/ACH
      IF(N.NE.NC)WRITE(6,102)M,PP,TT,U1,U2,U3,U4,DUM,DAM,DHSTAG
      IF(N.EQ.NC)WRITE(6,102)M,PP,TT,U1,U2,U3,U4,DUM,DAM,CF,CH
```

300

```
      WRITE(6,117)(DISS(I),I=1,NSPEC),WSUM
   50 CONTINUE
C
      IF(K.EQ.KA)WRITE(21)U,UN,P,T,A,S,SN,ST,STN,SXI
      IF(K.EQ.KA) END FILE 21
      RETURN
      END
C
C
```

```
      SUBROUTINE OUT(TT,PP)
C                                                                       OUT    2
C     SETS UP AND WRITES OUTPUT FOR TRANSPORT PROPERTIES                OUT    3
C                                                                       OUT    4
      REAL LEWI
      LOGICAL FROZN
      COMMON/CONTRL/FROZN
      COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
     1NM,NR
      COMMON/TRANS1/CPRR(10),HRRT(10),CVIBR(10),ROTM(10),RELXTN(10),
     1ANS(15),LEWI(10,10)
C                                                                       OUT   39
    2 WRITE(6,140)                                                      OUT  115
  140 FORMAT(1HO,37X,57HTRANSPORT PROPERTIES AT ASSIGNED TEMPERATURE ANDOUT  117
     1 PRESSURE/)                                                       OUT  118
      IF(.NOT.FROZN) GO TO 105                                          OUT  172
      WRITE(6,106)                                                      OUT  173
  106 FORMAT (32X,4HTEMP,3X,9HVISCOSITY,2X,9HMONATOMIC,2X,8HINTERNAL,4X,OUT  174
     16HFROZEN,6X,2HCP,8X,7HPRANDTL/52X,4HCOND,7X,4HCOND,7X,4HCOND,9X,  OUT  175
     24HFROZ,5X,4HFROZ//31X,5HDEG K,5X,5HPOISE,5X,27H----- CAL/(CM)(SEC)OUT  176
     1(K) ----,5X,10HCAL/(G)(K)///)                                     OUT  177
      WRITE(6,107)  TT,(ANS(I),I=1,4),ANS(7),ANS(9)
  107 FORMAT(30X,I6,F9.0,5HX10-6,F6.0,5HX10-6,F6.0,5HX10-6,F6.0,5HX10-6,OUT  179
     1F8.4,F10.4)                                                       OUT  180
      GO TO 108                                                         OUT  181
  105 WRITE(6,109)                                                      OUT  182
  109 FORMAT (2X,4HTEMP,3X,9HVISCOSITY,2X,9HMONATOMIC,2X,8HINTERNAL,4X, OUT  183
     16HFROZEN,5X,8HREACTION,3X,11HEQUILIBRIUM,3X,2HCP,9X,2HCP,7X,      OUT  184
     27HPRANDTL,3X,7HPRANDTL,4X,5HLEWIS/22X,4HCOND,7X,4HCOND,7X,4HCOND, OUT  185
     38X,4HCOND,8X,4HCOND,9X,4HFROZ,7X,2HEQ,6X,4HFROZ,7X,2HEQ,6X,       OUT  186
     46HNUMBER//1X,5HDEG K,5X,5HPOISE,5X,                               OUT  187
     554H------------------ CAL/(CM)(SEC)(K) ------------------,7X,      OUT  188
     610HCAL/(G)(K),7X,25H ---- DIMENSIONLESS -----///)                 OUT  189
C                                                                       OUT  190
C     WRITE DATA                                                        OUT  191
C                                                                       OUT  192
      IF(LEWIS.EQ.0.) GO TO 135                                         OUT  193
      WRITE(6,110)  TT,(ANS(I),I=1,11)
  110 FORMAT(F9.2,F9.0,5HX10-6,F6.0,5HX10-6,F6.0,5HX10-6,F6.0,5HX10-6,   0
     1F7.0,5HX10-6,F7.0,5HX10-6,F8.4,4F10.4)                            OUT  196
      GO TO 108
  135 WRITE(6,136)  TT,(ANS(I),I=1,10)
  136 FORMAT(F9.2,F9.0,5HX10-6,F6.0,5HX10-6,F6.0,5HX10-6,F6.0,5HX10-6,
     1F7.0,5HX10-6,F7.0,5HX10-6,F8.4,3F10.4)                            OUT  200
  108 CONTINUE
      WRITE(6,1100)((LEWI(I,J),I=1,NM),J=1,NM)
 1100  FORMAT(//50X,5E10.5)
C                                                                       OUT  239
      RETURN                                                            OUT  240
      END                                                               OUT  241
C
C
```

```
      SUBROUTINE LGRNGE(TT)                                              LGRN   1
C                                                                        LGRN   2
      COMMON /INTERP/ Z(20),Y(20,3),NTP,ANSR(3)
C                                                                        LGRN   4
      DIMENSION A(10)                                                    LGRN   5
C                                                                        LGRN   6
      EQUIVALENCE (XX,A(1)),(X0,A(2)),(X1,A(3)),(X2,A(4)),(X3,A(5)),     LGRN   7
     1(Y0,A(6)),(Y1,A(7)),(Y2,A(8)),(Y3,A(9))                            LGRN   8
C                                                                        LGRN   9
      IF(TT-Z(2))10,10,11                                                LGRN  10
   10 MX=1                                                               LGRN  11
      GO TO 51                                                           LGRN  12
   11 IF(TT-Z(NTP-1)) 12,12,13                                           LGRN  13
   13 MX=NTP-3                                                           LGRN  14
      GO TO 51                                                           LGRN  15
   12 K=NTP-1                                                            LGRN  16
      DO 14 JA=2,K                                                       LGRN  17
      IF(TT-Z(JA))15,15,14                                               LGRN  18
   15 MX=JA-2                                                            LGRN  19
      GO TO 51                                                           LGRN  20
   14 CONTINUE                                                           LGRN  21
   51 XX=ALOG(TT+1.0)                                                    LGRN  22
      DO 23 I=1,4                                                        LGRN  23
      MXI=MX+I-1                                                         LGRN  24
   23 A(I+1)=ALOG(Z(MXI)+1.0)                                            LGRN  25
      B1=((XX-X1)*(XX-X2)*(XX-X3))/(X0-X1)/(X0-X2)/(X0-X3)               LGRN  26
      B2=((XX-X0)*(XX-X2)*(XX-X3))/(X1-X0)/(X1-X2)/(X1-X3)               LGRN  27
      B3=((XX-X0)*(XX-X1)*(XX-X3))/(X2-X0)/(X2-X1)/(X2-X3)               LGRN  28
      B4=((XX-X0)*(XX-X1)*(XX-X2))/(X3-X0)/(X3-X1)/(X3-X2)               LGRN  29
      DO 8 J=1,3                                                         LGRN  30
      DO 3 I=1,4                                                         LGRN  31
      MXI=MX+I-1                                                         LGRN  32
    3 A(I+5)=ALOG(Y(MXI,J)+1.0)                                          LGRN  33
      ANSWR=B1*Y0+B2*Y1+B3*Y2+B4*Y3                                      LGRN  34
    8 ANSR(J)=EXP(ANSWR)-1.0                                             LGRN  35
      RETURN                                                             LGRN  36
      END                                                                LGRN  37
C
C
```

```
@ ANT CDR                                                                    25 NOV 72
    1.  DEL TRANSX/CODE                                                              4:52:44.87
    TRANSX   CODE     RELOCATABLE                                                    4:52:44.98
                                                                                     4:52:45.20
    2.  DEL ACHEM/CODE
    ACHEM    CODE     RELOCATABLE                                                    4:52:45.25
                                                                                     4:52:45.26
    3.  DEL GAMAR/CODE
    GAMAR    CODE     RELOCATABLE

      END CDR LCC 1102-0039 L9
```

19 OCT 72	05:09:58	1	01511512	24	1	(DELETED)
		0	01511542	14	2	
19 OCT 72	05:09:36	1	01476546	24	1	(DELETED)
		0	01476576	14	21	
19 OCT 72	05:10:05	1	01514104	24	1	(DELETED)
		0	01514134	14	17	

REACTING VISCOUS SHOCK LAYER SOLUTION AT ZERO FLOW INCIDENCE
PROGRAM G132

FINITE-RATE FLOWFIELD ABOUT A 2 FT SHPERE ON THE TRAJECTORY POINT NO 3

RUN NUMBER 9 ON 6/12/72
LB= 1 LE= 1

MA= 10 NA= 15 KA= 200 JA= 25 BETA= .00

GAMMA= .1400000+01 STAB= .7000000+00

RE= .7200D+04 PR= .7100D+00 LEWIS= .1500D+01 RN= .2000D+01 TW= .1000D+02

ZO= .0000 YO= .0000 XIMAX= .1000+01 ANGLE= .1000D+02

UO=.2500+05 PIN=.4364-01 HIN=.1980+07 RIN=.7714-07 TIN=.3296+03 EIN=.1414+07 ACH=.2809+02

EPS 1 TO 7
.100000-03 .100000-01 .100000+00

- DIVIDE CHECK AT 014427
- DIVIDE CHECK AT 014437
- DIVIDE CHECK AT 014427
- DIVIDE CHECK AT 014437
- DIVIDE CHECK AT 014427
- DIVIDE CHECK AT 014437
- DIVIDE CHECK AT 014427
- DIVIDE CHECK AT 014437
- DIVIDE CHECK AT 014427
- DIVIDE CHECK AT 014437

FROZEN ISOTHE CATALY

```
   250.000  7250.000 14000.000
N                      .1401+02  .0000      .0000
  .29580084+01   .72396636-04  -.19303650-08   .65164957-14  -.85710962-21
  .52845241+05  -.35702222+00   .24773161+01   .82901024-04  -.76060977-07
  .22462036-10  -.15404079-14   .56132605+05   .39987642+01
NO                     .3001+02  .0000      .0000
  .44678487+01   .22695846-04  -.14324959-09   .16591432-14   .63494057-22
  .86956018+04  -.19150373+01   .31967976+01   .11768965-02  -.38778399-06
  .55730992-10  -.28006146-14   .96652406+04   .61134104+01
N2                     .2802+02  .7670+00   .0000
  .44517456+01   .21995996-04  -.20501717-09   .24035750-14   .82543275-22
 -.23783613+04  -.36415174+01   .32066185+01   .96095003-03  -.26764111-06
  .33487899-10  -.15439933-14  -.99993079+03   .44601651+01
0                      .1600+02  .0000      .0000
  .25750267+01   .22026986-04   .50533473-10  -.11757918-13  -.13900519-20
  .28692301+05   .44633487+01   .26847763+01  -.24357548-03   .96464480-07
 -.13270647-10   .65179101-15   .29176733+05   .41135781+01
02                     .3200+02  .2330+00   .0000
  .44763073+01   .33173559-04  -.11257496-09   .13687415-14   .68543405-22
 -.20175246+04  -.18259916+01   .32206321+01   .13129468-02  -.46651373-06
  .70940134-10  -.38179530-14  -.10142978+04   .59381147+01
NO+                    .3001+02  .0000      .0000
  .44517063+01   .23790900-04  -.20057345-09   .23327397-14   .73175507-22
  .11649996+06  -.28547776+01   .32070007+01   .95463964-03  -.26312343-06
  .32660308-10  -.14945999-14   .11808876+06   .52543095+01
E-                     .5200-03  .0000     -.1481+04
  .25000000+01   .00000000      .00000000      .00000000      .00000000
 -.74537492+03  -.12427286+02   .25000000+01   .00000000      .00000000
  .00000000      .00000000     -.74537498+03  -.12427286+02
LAST                   .0000     .0000      .0000
```


150 x 200

120 x 300

17°

O	O2		14	1	•0
1000.0000	8.7760	1.1690	1.1510		
1500.0000	8.0930	1.1750	1.1370		
2000.0000	7.6240	1.1790	1.1410		
2500.0000	7.2690	1.1820	1.1440		
3000.0000	6.9850	1.1850	1.1470		
3500.0000	6.7490	1.1880	1.1490		
4000.0000	6.5460	1.1900	1.1520		
4500.0000	6.3740	1.1920	1.1540		
5000.0000	6.2190	1.1940	1.1560		
6000.0000	5.9560	1.1970	1.1590		
7000.0000	5.7390	1.2000	1.1620		
8000.0000	5.5530	1.2020	1.1640		
9000.0000	5.3920	1.2050	1.1670		
10000.0000	5.2500	1.2070	1.1690		
N2	O		14	1	•0
1000.0000	10.6100	1.1970	1.1590		
1500.0000	9.6100	1.2250	1.1670		
2000.0000	8.9260	1.2110	1.1730		
2500.0000	8.4060	1.2150	1.1780		
3000.0000	7.9960	1.2190	1.1820		
3500.0000	7.6590	1.2230	1.1860		
4000.0000	7.3740	1.2260	1.1890		
4500.0000	7.1260	1.2290	1.1930		
5000.0000	6.8990	1.2310	1.1950		
6000.0000	6.5350	1.2360	1.2010		
7000.0000	6.2280	1.2400	1.2050		
8000.0000	5.9710	1.2440	1.2090		
9000.0000	5.7440	1.2470	1.2130		
10000.0000	5.5460	1.2500	1.2170		
N2	N2		20	1	2.0
200.0000	15.4310	1.0880	1.1050		
250.0000	14.4350	1.0870	1.0930		
300.0000	13.7780	1.0870	1.0870		
350.0000	13.3040	1.0890	1.0800		
400.0000	12.9450	1.0910	1.0830		
500.0000	12.4210	1.0950	1.0890		
700.0000	11.7670	1.1010	1.0950		
1000.0000	11.1700	1.1100	1.0960		
1500.0000	10.5400	1.1260	1.1070		
2000.0000	10.0100	1.1390	1.1150		
2500.0000	9.5200	1.1470	1.1200		
3000.0000	9.0710	1.1560	1.1250		
3500.0000	8.6970	1.1670	1.1300		
4000.0000	8.3500	1.1700	1.1330		
5000.0000	7.8040	1.1830	1.1420		
6000.0000	7.3940	1.1950	1.1470		
7000.0000	7.0350	1.2000	1.1520		
8000.0000	6.7210	1.2010	1.1550		
9000.0000	6.4740	1.2050	1.1580		
10000.0000	6.2790	1.2080	1.1580		
N2	O2		20	1	•0
200.0000	14.9750	1.0900	1.1200		
250.0000	13.9160	1.0870	1.0990		
300.0000	13.2150	1.0870	1.0910		
350.0000	12.7160	1.0870	1.0870		
400.0000	12.3370	1.0890	1.0830		

600.0000	11.4210	1.0970	1.0930		
800.0000	10.8500	1.1100	1.0940		
1000.0000	10.4660	1.1320	1.1130		
1500.0000	10.0500	1.1540	1.1280		
2000.0000	9.8020	1.1710	1.1400		
2500.0000	9.5960	1.1800	1.1510		
3000.0000	9.4120	1.1930	1.1590		
4000.0000	9.0800	1.2050	1.1690		
5000.0000	8.7660	1.2120	1.1760		
6000.0000	8.4840	1.2170	1.1800		
7000.0000	8.2320	1.2210	1.1840		
8000.0000	7.9910	1.2240	1.1880		
9000.0000	7.7240	1.2270	1.1910		
10000.0000	7.4860	1.2300	1.1940		
02	02		20	1	2.0
200.0000	14.6460	1.0920	1.1420		
250.0000	13.5130	1.0890	1.1090		
300.0000	12.7630	1.0870	1.0960		
350.0000	12.2310	1.0870	1.0900		
400.0000	11.8340	1.0870	1.0870		
500.0000	11.2710	1.0900	1.0820		
600.0000	10.8840	1.0930	1.0870		
800.0000	10.2900	1.1020	1.0930		
1000.0000	9.8960	1.1150	1.0990		
1500.0000	9.4700	1.1300	1.1090		
2000.0000	9.2260	1.1470	1.1170		
2500.0000	9.0220	1.1550	1.1240		
3000.0000	8.8400	1.1620	1.1280		
4000.0000	8.5160	1.1700	1.1340		
5000.0000	8.2460	1.1760	1.1390		
6000.0000	7.9630	1.1800	1.1430		
7000.0000	7.7020	1.1840	1.1450		
8000.0000	7.4790	1.1860	1.1470		
9000.0000	7.2850	1.1880	1.1490		
10000.0000	7.1140	1.1900	1.1510		
N	N		14	1	.0
1000.0000	7.0390	1.1290	1.1440		
1500.0000	6.2920	1.1340	1.1440		
2000.0000	5.8120	1.1380	1.1440		
2500.0000	5.4640	1.1420	1.1430		
3000.0000	5.1930	1.1440	1.1430		
3500.0000	4.9720	1.1470	1.1420		
4000.0000	4.7660	1.1490	1.1410		
4500.0000	4.6280	1.1510	1.1410		
5000.0000	4.4880	1.1520	1.1410		
6000.0000	4.2540	1.1550	1.1420		
7000.0000	4.0620	1.1580	1.1410		
8000.0000	3.9020	1.1600	1.1410		
9000.0000	3.7640	1.1620	1.1410		
10000.0000	3.6430	1.1630	1.1410		
N	N0		10	1	.0
1000.0000	9.4370	1.2040	1.1660		
1500.0000	8.5030	1.2120	1.1740		
2000.0000	7.8690	1.2160	1.1810		
2500.0000	7.3930	1.2230	1.1860		
3000.0000	7.0150	1.2270	1.1910		
4000.0000	6.4390	1.2340	1.1990		

5000.0000	6.0060	1.2400	1.2050			
6000.0000	5.6670	1.2460	1.2110			
7000.0000	5.3860	1.2490	1.2160			
8000.0000	5.1460	1.2530	1.2210			
N	N2		14	1		.0
1000.0000	9.6240	1.1960	1.1570			
1500.0000	8.6970	1.2030	1.1650			
2000.0000	8.2720	1.2090	1.1710			
2500.0000	7.8020	1.2140	1.1760			
3000.0000	7.4270	1.2180	1.1800			
3500.0000	7.1150	1.2210	1.1840			
4000.0000	6.8500	1.2240	1.1870			
4500.0000	6.6220	1.2270	1.1900			
5000.0000	6.4190	1.2290	1.1930			
6000.0000	6.0600	1.2340	1.1980			
7000.0000	5.7990	1.2380	1.2030			
8000.0000	5.5580	1.2410	1.2070			
9000.0000	5.3550	1.2450	1.2100			
10000.0000	5.1700	1.2470	1.2140			
N	0		14	1		.0
1000.0000	8.4180	1.1760	1.1920			
1500.0000	7.2270	1.1770	1.1640			
2000.0000	6.4940	1.1770	1.1760			
2500.0000	5.9840	1.1760	1.1560			
3000.0000	5.6060	1.1760	1.1380			
3500.0000	5.3100	1.1720	1.1270			
4000.0000	5.0750	1.1660	1.1260			
4500.0000	4.8990	1.1690	1.1280			
5000.0000	4.7450	1.1700	1.1290			
6000.0000	4.4900	1.1730	1.1290			
7000.0000	4.2820	1.1750	1.1330			
8000.0000	4.1060	1.1770	1.1340			
9000.0000	3.9590	1.1780	1.1350			
10000.0000	3.8290	1.1800	1.1370			
N0	N0		17	1		2.0
200.0000	15.1540	1.0950	1.1320			
250.0000	13.9740	1.0940	1.1150			
300.0000	13.1920	1.0940	1.1050			
350.0000	12.6300	1.0950	1.1010			
400.0000	12.2030	1.0960	1.0960			
500.0000	11.5930	1.0990	1.0940			
600.0000	11.1770	1.1010	1.0930			
700.0000	10.8620	1.1030	1.0900			
800.0000	10.6080	1.1050	1.0920			
1000.0000	10.2210	1.1060	1.0900			
1200.0000	9.9410	1.1100	1.0950			
1500.0000	9.6130	1.1130	1.0970			
2000.0000	9.2060	1.1170	1.0960			
2500.0000	8.9070	1.1200	1.0950			
3000.0000	8.6700	1.1220	1.0950			
4000.0000	8.3110	1.1250	1.0950			
5000.0000	8.0460	1.1280	1.0950			
N0	0		13	1		.0
500.0000	6.5510	1.2130	1.1750			
1000.0000	5.3960	1.2290	1.1920			
1500.0000	4.7710	1.2390	1.2040			
2000.0000	4.3500	1.2470	1.2130			
2500.0000	4.0370	1.2530	1.2210			

3000.0000	3.7690	1.2560	1.2270
4000.0000	3.4130	1.2670	1.2380
5000.0000	3.1350	1.2750	1.2470
6000.0000	2.9160	1.2810	1.2560
7000.0000	2.7370	1.2860	1.2630
8000.0000	2.5860	1.2910	1.2690
9000.0000	2.4570	1.2960	1.2760
10000.0000	2.3440	1.3000	1.2810
C	C	14 I	.0
1000.0000	7.1620	1.1630	1.1410
1500.0000	6.5640	1.1630	1.1560
2000.0000	6.1390	1.1650	1.1600
2500.0000	5.8210	1.1690	1.1630
3000.0000	5.5670	1.1730	1.1680
3500.0000	5.3550	1.1770	1.1720
4000.0000	5.1740	1.1800	1.1800
4500.0000	5.0160	1.1820	1.1840
5000.0000	4.8760	1.1840	1.1850
6000.0000	4.6400	1.1880	1.1820
7000.0000	4.4360	1.1910	1.1820
8000.0000	4.2710	1.1950	1.1820
9000.0000	4.1160	1.1960	1.1810
10000.0000	3.9960	1.1980	1.1810
LAST		0 0	.0

TABLES OF TRANSPORT AND RELAXATION DATA ARE FILLED

2.	0.	1.	0.	0.
0.	2.	1.	0.	1.
0.	0.	0.	2.	1.
0.	0.	0.	0.	0.
0.				

$K = A * EXP(-B/T) * T_e^N$
(UNITS - CC/MOLE/SEC)

	REACTIONS CONSIDERED							A	B	N	REACTION TYPE
1	N2	+N	+	= N	+N	+N		.91000+23	.1130n+06	-.1500n+01	3
2	N2	+N2	+	= N	+N	+N2		.46000+18	.1130n+06	-.50000+00	3
3	N2	+NO	+	= N	+N	+NO		.19000+18	.1130n+06	-.50000+00	3
4	N2	+O	+	= N	+N	+O		.19000+18	.1130n+06	-.50000+00	3
5	N2	+O2	+	= N	+N	+O2		.19000+18	.1130n+06	-.50000+00	3
6	NO	+N	+	= N	+O	+N		.79000+22	.7550n+05	-.15000+01	3
7	NO	+N2	+	= N	+O	+N2		.39000+21	.7500n+05	-.15000+01	3
8	NO	+NO	+	= N	+O	+NO		.79000+22	.7550n+05	-.15000+01	3
9	NO	+O	+	= N	+O	+O		.79000+22	.7550n+05	-.15000+01	3
10	NO	+O2	+	= N	+O	+O2		.39000+21	.7550n+05	-.15000+01	3
11	N2	+O	+	= NO	+N	+		.70000+14	.3800n+05	.00000	1
12	N2	+O2	+	= NO	+NO	+		.46000+25	.6400n+05	-.25000+01	1
13	NO	+O	+	= O2	+N	+		.32000+10	.1970n+05	.10000+01	1
14	O2	+N	+	= O	+O	+N		.36000+20	.5950n+05	-.10000+01	3
15	O2	+N2	+	= O	+O	+N2		.48000+21	.5950n+05	-.15000+01	3
16	O2	+NO	+	= O	+O	+NO		.36000+20	.5950n+05	-.10000+01	3
17	O2	+O	+	= O	+O	+O		.64000+24	.5950n+05	-.20000+01	3
18	O2	+O2	+	= O	+O	+O2		.19000+22	.5950n+05	-.15000+01	3
19	N	+O	+	= NO+	+E-	+		.65000+12	.3190n+05	.00000	1

SPECIES		INIT. MOLE FRACTION	MOL. WT.	TEMPERATURE COEFFICIENTS(0-8000 DEGREES KELVIN)						
				B(I,1)	B(I,2)	B(I,3)	B(I,4)	B(I,5)	B(I,6)	B(I,7)
1	N	.000	14.00800	.2477316+01	.8290142-04	-.7606896-07	.2246204-10	-.1540408-14	.5613260+05	.3998764+01
2	NO	.000	30.00600	.3196798+01	.1176897-02	-.3877640-06	.5573099-10	-.2880615-14	.9865241+04	.6113410+01
3	N2	.767+00	28.01400	.3206618+01	.9609500-03	-.2676411-06	.3348790-10	-.1543993-14	-.9999308+03	.4460165+01
4	O	.000	16.00000	.2684776+01	-.2435755-03	.9646446-07	-.1327065-10	.6517910-15	.2917673+05	.4113578+01
5	O2	.233+00	32.00000	.3220632+01	.1312947-02	-.4665137-06	.7096013-10	-.3817953-14	-.1014298+04	.5938115+01

6	NO+	•000	30•000000	•3207001,01	•95463%6-03	-•2631234-06	•3266031-10	-•1494630-14	•1180888+06	•5254309+01
7	E-	•000	•000052	•2500000+01	•00000 0	•0000000	•0000000	•0000000	-•7453750+03	-•1242729+02

TEMPERATURE COEFFICIENTS(8000-30000DEGREES KELVIN)

	A(I,1)	A(I,2)	A(I,3)	A(I,4)	A(I,5)	A(I,6)	A(I,7)
•2958009+01	•7239664-04	-•1930365-08	•6516496-14	-•8571098-21	•5284524+05	-•3578222+00	
•4467649+01	•2269585-04	-•1402496-09	•1659183-14	•6•499C6-22	•8695602+04	-•1915037+01	
•4451746+01	•2199600-04	-•2050172-09	•2403575-14	•8954327-22	-•2378361+04	-•3641517+01	
•2575027+01	•2202699-04	•5053347-10	-•1175792-13	-•1490052-20	•2869230+05	•4463349+01	
•4476307+01	•3317356-04	-•1125750-09	•1368742-14	•6A54340-22	-•2012525+04	-•1825992+01	
•4451706+01	•2379090-04	-•2005735-09	•2332740-14	•7•17551-22	•1167000+06	-•2854778+01	
•2500000+01	•0000000	•0000000	•0000000	•0n0C000	-•7453749+03	-•1242729+02	

REACTION TYPES

A + B = C + D	1
A + B + (M) = C + (M)	2
A + b = C + D + E	3
A + b = C	4
A + (M) = B + C + (M)	5
A + B + C = D + E	6

PRODUCT - REACTANT MATRIX

3	1	n	1	1	1
3	3	n	1	1	3
3	2	n	1	1	2
3	4	n	1	1	4
3	5	n	1	1	5
2	1	n	1	4	1
2	3	n	1	4	3
2	2	n	1	4	2
2	4	n	1	4	4
2	5	n	1	4	5
3	4	n	2	1	0
3	5	n	2	2	0
2	4	n	5	1	0
5	1	n	4	4	1
5	3	n	4	4	3
5	2	n	4	4	2
5	4	n	4	4	4
5	5	n	4	4	5
1	4	n	A	7	0

•00
•00
•00
•00
•00
•00
-1481.25

I=	XI=	ZB=	YB=	ZLY=	CURV=
2	.0000	1.000	.00000	1.57080	1.000
3	.1000	.995	.10000	1.47063	1.000
4	.2000	.980	.19950	1.36995	1.000
5	.3000	.955	.29749	1.26874	1.000
6	.4000	.920	.39296	1.16695	1.000
7	.5000	.875	.48492	1.06453	1.000
8	.6000	.820	.57237	.96140	1.000
9	.7000	.756	.65437	.85744	1.000
10	.8000	.683	.72999	.75249	1.000
11	.9000	.602	.79834	.64627	1.000
12	1.0000	.513	.85856	.53835	1.000
2	1.0000				
3	1.0000				
4	1.0000				
5	1.0000				
6	1.0000				
7	1.0000				
8	1.0000				
9	1.0000				
10	1.0000				
11	1.0000				
12	1.0000				
13	1.0000				
14	1.0000				
15	1.0000				
16	1.0000				
17	1.0000				

DT1= •0000000 DT2= •3000000 AT J= 1 M= 0

TIME= •0000000

	Y	SHOCK VELOCITY	SY	ZS	YS
2	•00000	-•82919-01	•36806-05	•11116+01	•11094-09
3	•10000+00	-•52631-02	•41309-01	•11109+01	•11165+00
4	•20000+00	•78654-01	•40393-01	•10986+01	•22367+00
5	•30000+00	•16128+00	•39437-01	•10748+01	•33491+00
6	•40000+00	•22880+00	•38419-01	•10395+01	•44423+00
7	•50000+00	•86584-01	•37309-01	•99274+00	•55044+00
8	•60000+00	•87543-01	•36065-01	•93462+00	•65238+00
9	•70000+00	•87495-01	•34624-01	•86540+00	•74889+00
10	•80000+00	•51736-01	•32882-01	•78536+00	•83883+00
11	•90000+00	•12906-01	•30654-01	•69481+00	•92109+00
12	•10000+01	•10958-01	•53123-01	•59395+00	•99457+00

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	•96543+03	•11838+03	•79223+01	•32976-07	-•41483+01	•43510+03	•24842+00	•80018-01	-•1917-02
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
3	•96054+03	•11782+03	•78856+01	•32740+01	-•40564+01	•43791+03	•23817+00	•79965-01	-•6878-02
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
4	•94714+03	•11631+03	•78472+01	•57166+01	-•37750+01	•44185+03	•44755+00	•80377-01	-•1195-01
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
5	•91570+03	•11275+03	•78369+01	•86430+01	-•34391+01	•44771+03	•61810+00	•86333-01	-•1556-01
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
6	•86471+03	•10695+03	•77900+01	•11715+02	-•30851+01	•45523+03	•82847+00	•89196-01	-•1859-01
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
7	•79896+03	•99435+02	•77589+01	•14309+02	-•26982+01	•45874+03	•10361+01	•96124-01	-•1046-01
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
8	•72702+03	•91161+02	•77170+01	•16956+02	-•21407+01	•46693+03	•12749+01	•10290+00	-•9427-02
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
9	•65645+03	•82989+02	•76900+01	•19204+02	-•13402+01	•47499+03	•15114+01	•11261+00	-•8006-02
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
10	•58353+03	•74483+02	•76652+01	•21214+02	-•38110+00	•48257+03	•17670+01	•12430+00	-•5027-02
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
11	•52291+03	•67882+02	•76107+01	•22688+02	•94488+00	•48826+03	•19988+01	•13990+00	-•1963-02
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	
12	•44370+03	•58364+02	•76193+01	•24468+02	•21439+01	•49774+03	•23486+01	•16100+00	-•1373-03
	•00000	•00000	•76700+00	•00000	•23300+00	•00000	•00000	•28853+02	

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	•96567+03	•79631+02	•84769+01	•00000	-•36538+01	•49413+03	•29115+00	•74684-01	-•9381-01
	•22674+00	•47106-01	•51824+00	•17630+00	•31227-01	•38706-03	•34674-08	•20718+02	
3	•97156+03	•79224+02	•86043+01	•32515+01	-•34938+01	•49006+03	•29151+00	•74634-01	-•8469-01
	•21662+00	•46221-01	•52711+00	•17587+00	•31590-01	•39226-03	•19042-08	•20879+02	
4	•94638+03	•79163+02	•86730+01	•57613+01	-•33157+01	•49964+03	•40648+00	•75018-01	-•1021+00
	•21660+00	•46302-01	•52913+00	•17311+00	•32485-01	•37751-03	•59604-08	•20913+02	
5	•91467+03	•77221+02	•84284+01	•85066+01	-•29910+01	•49780+03	•54356+00	•80578-01	-•9075-01
	•19640+00	•50440-01	•54523+00	•17469+00	•32961-01	•27264-03	•11421-07	•21212+02	
6	•86315+03	•76494+02	•82060+01	•11388+02	-•25850+01	•49777+03	•75293+00	•83250-01	-•8466-01
	•17091+00	•53521-01	•56967+00	•16882+00	•36873-01	•20746-03	•11118-07	•21716+02	
7	•79049+03	•73351+02	•80870+01	•13801+02	-•23408+01	•49533+03	•93836+00	•89716-01	-•6688-01
	•13937+00	•56699-01	•60334+00	•16222+00	•40963-01	•20387-03	•61349-08	•22366+02	

8	.71845+03	.73464+02	.79963+01	.16386+02	-.18386+01	.49437+03	.11630+01	.98041-01	-.5286-01
	.10367+00	.61043-01	.63451+00	.15241+00	.46219-01	.13902-03	.38116-08	.23187+02	
9	.64662+03	.67150+02	.77862+01	.18537+02	-.11049+01	.49580+03	.13799+01	.10510+00	-.4132-01
	.74685-01	.64204+01	.66265+00	.14247+00	.56356-01	.33988-04	.81376-08	.23940+02	
10	.57351+03	.63269+02	.76412+01	.20456+02	-.22031+00	.49567+03	.14153+01	.11602+00	-.2667-01
	.47447-01	.66024-01	.68871+00	.12975+00	.68069-01	.13300-05	.26514-08	.24745+02	
11	.50620+03	.56906+02	.74913+01	.21960+02	.10095+01	.49821+03	.14340+01	.13057+00	-.1825-01
	.30964-01	.65675-01	.70534+00	.11833+00	.79672-01	.00000	.19930-08	.25336+02	
12	.43319+03	.54665+02	.71146+01	.23198+02	.20214+01	.50029+03	.24565+01	.15027+00	-.9499-02
	.17437-01	.65388-01	.71902+00	.10894+00	.89219-01	-.10945-05	.14248-08	.25848+02	

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.98060+03	.67814+02	.92883+01	.00000	-.30531+01	.51557+03	.18060+00	.69349-01	-.1174+00
	.31701+00	.27546-01	.43696+00	.21321+00	.42081-02	.10607-02	.16912-07	.18986+02	
3	.99322+03	.67486+02	.94923+01	.32672+01	-.28807+01	.51106+03	.25990+00	.69303-01	-.1076+00
	.30545+00	.28470-01	.44684+00	.21370+00	.42854-02	.12552-02	.11864-07	.19136+02	
4	.95720+03	.67703+02	.90837+01	.57174+01	-.27786+01	.52448+03	.37828+00	.69660-01	-.1330+00
	.30989+00	.28662-01	.44728+00	.20856+00	.45148-02	.10917-02	.17210-07	.19125+02	
5	.92157+03	.66058+02	.92497+01	.83130+01	-.24833+01	.50350+03	.53715+00	.74822-01	-.8497-01
	.24207+00	.32527-01	.48496+00	.21444+00	.50117-02	.99499-03	.10706-07	.19718+02	
6	.85658+03	.65123+02	.89364+01	.11002+02	-.22369+01	.50406+03	.79007+00	.77303-01	-.7921-01
	.22916+00	.37082-01	.51624+00	.21056+00	.62059-02	.75348-03	.12945-07	.20233+02	
7	.78937+03	.63932+02	.86016+01	.13370+02	-.19443+01	.50484+03	.88779+00	.83306-01	-.7324-01
	.20135+00	.40909-01	.54395+00	.20577+00	.73934-02	.62179-03	.14979-07	.20706+02	
8	.71348+03	.62267+02	.82763+01	.15903+02	-.15145+01	.50597+03	.10975+01	.89181-01	-.6526-01
	.16156+00	.47560-01	.58180+00	.19878+00	.98202-02	.47100-03	.88971-08	.21437+02	
9	.64121+03	.60334+02	.79625+01	.17914+02	-.85078+00	.50598+03	.13899+01	.97591-01	-.5506-01
	.12583+00	.54319-01	.61500+00	.19170+00	.12766-01	.37901-03	.93804-08	.22146+02	
10	.56709+03	.57744+02	.76625+01	.19693+02	-.49473+01	.50322+03	.14960+01	.10773+00	-.3837-01
	.90231-01	.62158-01	.64732+00	.18256+00	.17502-01	.22978-03	.30784-08	.22942+02	
11	.49562+03	.54793+02	.73251+01	.21193+02	.10501+01	.50393+03	.14982+01	.12125+00	-.2828-01
	.64383-01	.68415-01	.67042+00	.17313+00	.23504-01	.14579-03	.28742-08	.23601+02	
12	.41682+03	.51441+02	.68139+01	.22490+02	.19983+01	.50455+03	.19095+01	.13954+00	-.1772-01
	.42092-01	.73810-01	.59034+00	.16500+00	.28679-01	.73357-04	.27019-08	.24200+02	

AT LINE 5

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
4	.99108+03	.68924+02	.10131+02	.00000	-.24961+01	.51561+03	.14734+00	.64014-01	-.1035+00
	.36775+00	.15297-01	.40397+00	.22342+00	.90299-03	.16598-02	.24756-07	.18364+02	
3	.10038+04	.68670+02	.10337+02	.32681+01	-.23766+01	.50936+03	.24120+00	.63972-01	-.9040-01
	.34353+00	.16055-01	.41632+00	.22187+00	.94349-03	.12755-02	.32940-07	.18545+02	
4	.96462+03	.68887+02	.99664+01	.58162+01	-.23047+01	.51396+03	.37600+00	.64301-01	-.9866-01
	.33098+00	.17512-01	.42349+00	.22550+00	.10963-02	.14247-02	.26940-07	.18673+02	
5	.91431+03	.67972+02	.95717+01	.82016+01	-.21702+01	.51158+03	.50926+00	.69067-01	-.1281+00
	.34135+00	.16248-01	.42216+00	.21776+00	.10043-02	.14826-02	.22521-07	.18618+02	
6	.85133+03	.67697+02	.91887+01	.10731+02	-.19429+01	.52635+03	.67237+00	.71357-01	-.1135+00
	.30219+00	.19753-01	.45876+00	.21654+00	.14022-02	.13565-02	.18902-07	.19133+02	
7	.78498+03	.68050+02	.89868+01	.12942+02	-.16297+01	.51909+03	.83672+00	.76900-01	-.9091-01
	.24005+00	.22712-01	.49766+00	.21670+00	.17293-02	.11468-02	.18514-07	.19702+02	
8	.70668+03	.67295+02	.85094+01	.15434+02	-.12466+01	.51603+03	.10396+01	.82320-01	-.7762-01
	.21243+00	.28301-01	.54166+00	.21406+00	.25264-02	.93979-03	.13975-07	.20425+02	
9	.63162+03	.66032+02	.80671+01	.17306+02	-.66848+00	.51314+03	.12144+01	.90084-01	-.6393-01
	.17182+00	.34078-01	.57921+00	.21062+00	.35079-02	.76075-03	.11280-07	.21099+02	
10	.56710+03	.64243+02	.76343+01	.18982+02	.57208-01	.59945+03	.13978+01	.99441-01	-.4771-01
	.13284+00	.40835-01	.61524+00	.20577+00	.50315-02	.59455-03	.77242-08	.21818+02	

11	.4917+03	.52042+02	.71349+01	.20444+02	.10429+01	.50911+03	.15604+01	.11192+00	-.3736-01	
	.10176+00	.47131-01	.64291+00	.20035+00	.71904-02	.45589-03	.64677-08	.22436+02		
12	.4008+03	.49295+02	.65332+01	.21761+02	.19303+01	.50881+03	.17761+01	.12880+00	-.2617-01	
	.74923-01	.52600-01	.66783+00	.19548+00	.91340-02	.33105-03	.53329-08	.23023+02		

AT LINE 6

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10089+04	.56060+02	.11163+02	.00000	-.19287+01	.49886+03	.11561+00	.58680-01	-.5997-01
	.36413+00	.10427-01	.39658+00	.22658+00	.40576-03	.18745-02	.25844-07	.18254+02	
3	.10181+04	.56272+02	.11186+02	.31857+01	-.18792+01	.50514+03	.22141+00	.58641-01	-.7241-01
	.36541+00	.10309-01	.39723+00	.22469+00	.40671-03	.17063-02	.32335-07	.18251+02	
4	.97767+03	.56509+02	.10837+02	.57833+01	-.18139+01	.49932+03	.36933+00	.58943-01	-.6049-01
	.33602+00	.12534-01	.41759+00	.23171+00	.54148-03	.16077-02	.26537-07	.18548+02	
5	.91546+03	.55709+02	.10136+02	.76817+01	-.17598+01	.52911+03	.47188+00	.63311-01	-.1143+00
	.37093+00	.10016-01	.39802+00	.21873+00	.38236-03	.19185-02	.23864-07	.18244+02	
6	.83622+03	.55106+02	.96382+01	.10164+02	-.17051+01	.51710+03	.63934+00	.65410-01	-.8627-01
	.37524+00	.12407-01	.44176+00	.21831+00	.53798-03	.17418-02	.19437-07	.18812+02	
7	.77778+03	.53793+02	.95008+01	.12408+02	-.12600+01	.50557+03	.80578+00	.70491-01	-.5673-01
	.27692+00	.15040-01	.43595+00	.21974+00	.73469-03	.16136-02	.14179-07	.19435+02	
8	.70703+03	.53643+02	.89754+01	.14858+02	-.91630+00	.50431+03	.10028+01	.75460-01	-.4891-01
	.22899+00	.19181-01	.53037+00	.21913+00	.11033-02	.12285-02	.13382-07	.20115+02	
9	.62525+03	.52646+02	.83373+01	.16662+02	-.46364+00	.50438+03	.11651+01	.82577-01	-.4222-01
	.19299+00	.22860-01	.56391+00	.21782+00	.15107-02	.91023-03	.16105-07	.20666+02	
10	.54901+03	.51306+02	.77592+01	.18293+02	.18172+00	.50408+03	.13321+01	.91155-01	-.3407-01
	.15801+00	.26959-01	.59654+00	.21565+00	.20711-02	.78328-03	.11649-07	.21249+02	
11	.46956+03	.49522+02	.71053+01	.19685+02	.10462+01	.50344+03	.14982+01	.10259+00	-.2452-01
	.12719+00	.31191-01	.62524+00	.21282+00	.28980-02	.66532-03	.80156-08	.21803+02	
12	.38603+03	.47151+02	.63562+01	.20990+02	.18560+01	.50284+03	.14803+01	.11807+00	-.1380-01
	.98311-01	.35164-01	.65212+00	.21018+00	.36725-02	.55484-03	.45982-08	.22349+02	

AT LINE 7

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10198+04	.52516+02	.12145+02	.00000	-.14540+01	.47614+03	.89142-01	.53345-01	-.7560-02
	.36410+00	.83903-02	.40817+00	.22693+00	.28399-03	.21249-02	.21070-07	.18372+02	
3	.10352+04	.52980+02	.12063+02	.30970+01	-.14679+01	.49330+03	.20744+00	.53310-01	-.4175-01
	.34883+00	.80668-02	.39298+00	.22773+00	.26918-03	.21014-02	.24510-07	.18187+02	
4	.99572+03	.53353+02	.11735+02	.50902+01	-.14075+01	.48173+03	.32630+00	.53584-01	-.1921-01
	.33906+00	.96128-02	.42416+00	.22485+00	.34614-03	.19426-02	.20685-07	.18575+02	
5	.92351+03	.52404+02	.11205+02	.67306+01	-.14112+01	.47604+03	.43206+00	.57556-01	-.4619-02
	.32050+00	.99719-02	.43750+00	.22956+00	.37385-03	.20818-02	.16177-07	.18764+02	
6	.83447+03	.51260+02	.10605+02	.94686+01	-.13453+01	.46966+03	.65070+00	.59464-01	.1358-01
	.28452+00	.11593-01	.47423+00	.22747+00	.48054-03	.17044-02	.18141-07	.19250+02	
7	.76265+03	.50879+02	.10257+02	.11718+02	-.86402+00	.47022+03	.78389+00	.64083-01	.1683-01
	.25508+00	.12816-01	.50406+00	.22566+00	.56311-03	.18199-02	.11632-07	.19672+02	
8	.70799+03	.50591+02	.96014+01	.14161+02	-.58015+00	.47555+03	.99786+00	.68600-01	.1189-01
	.21815+00	.15588-01	.54051+00	.22352+00	.77866-03	.14560-02	.11642-07	.20222+02	
9	.62021+03	.49776+02	.87649+01	.15968+02	-.26710+00	.48020+03	.11364+01	.75070-01	.8890-02
	.18940+00	.17952-01	.56859+00	.22191+00	.10044-02	.11382-02	.13888-07	.20670+02	
10	.53955+03	.48613+02	.80219+01	.17564+02	.27242+00	.48309+03	.13945+01	.82868-01	.9987-02
	.16039+00	.20480-01	.59653+00	.22027+00	.12926-02	.10450-02	.90453-08	.21149+02	
11	.45663+03	.47091+02	.71916+01	.18869+02	.10134+01	.48565+03	.14409+01	.93265-01	.1214-01
	.13643+00	.22461-01	.61961+00	.21896+00	.16151-02	.92188-03	.72073-08	.21559+02	
12	.37151+03	.44990+02	.63042+01	.20145+02	.17373+01	.48816+03	.14041+01	.10734+00	.1585-01	
	.11304+00	.24395-01	.64215+00	.21768+00	.19301-02	.80159-03	.54117-08	.21975+02		

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10270+04	.49986+02	.12505+02	.00000	-.99731+00	.49534+03	.59911-01	.48011-01	-.3879-01
	.39771+00	.55657-02	.36644+00	.22817+00	.15753-03	.19651-02	.23268-07	.17847+02	
3	.10412+04	.50816+02	.12513+02	.30933+01	-.10750+01	.49705+03	.19718+00	.47979-01	-.4386-01
	.38731+00	.62931-02	.37428+00	.23005+00	.18814-03	.18897-02	.26792-07	.17948+02	
4	.10107+04	.51228+02	.12255+02	.43744+01	-.10795+01	.48539+03	.27619+00	.48226-01	-.2152-01
	.36515+00	.71228-02	.40564+00	.21978+00	.21843-03	.20846-02	.20773-07	.18303+02	
5	.93412+03	.50053+02	.11848+02	.61664+01	-.94584+00	.46390+03	.39675+00	.51800-01	.2368-01
	.31968+00	.64088-02	.43212+00	.23769+00	.29908-03	.17992-02	.20654-07	.18695+02	
6	.86120+03	.49055+02	.11294+02	.90594+01	-.79687+00	.47136+03	.58606+00	.53518-01	.1490-01
	.30031+00	.87408-02	.45411+00	.23503+00	.32417-03	.14810-02	.22326-07	.18964+02	
7	.79096+03	.48904+02	.10302+02	.11142+02	-.52766+00	.48138+03	.72807+00	.57675-01	-.1438-02
	.29182+00	.89025-02	.46593+00	.23125+00	.32809-03	.17739-02	.16246-07	.19116+02	
8	.73456+03	.48425+02	.97387+01	.13589+02	-.36362+00	.48523+03	.91655+00	.61740-01	-.3416-02
	.25640+00	.10535-01	.50284+00	.22820+00	.43193-03	.15698-02	.14873-07	.19623+02	
9	.61335+03	.47732+02	.88165+01	.15440+02	-.44361-01	.48659+03	.10765+01	.67563-01	-.4586-03
	.22266+00	.12247-01	.53693+00	.22623+00	.56130-03	.13588-02	.13666-07	.20122+02	
10	.52739+03	.46577+02	.79616+01	.17024+02	.36104+00	.48965+03	.12257+01	.74581-01	.1903-04
	.19533+00	.13511-01	.56428+00	.22497+00	.68273-03	.12337-02	.11795-07	.20542+02	
11	.44158+03	.45113+02	.70152+01	.18262+02	.99706+00	.49487+03	.13502+01	.83939-01	-.3455-02
	.17796+00	.13717-01	.58177+00	.22466+00	.74563-03	.11208-02	.10468-07	.20811+02	
12	.35535+03	.43079+02	.60449+01	.19514+02	.16405+01	.50016+03	.14901+01	.96602-01	-.5486-02
	.16043+00	.13926-01	.59947+00	.22436+00	.80927-03	.10066-02	.91742-08	.21091+02	

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10437+04	.48641+02	.12573+02	.00000	-.60372+00	.52728+03	.35139-01	.42676-01	-.9784-01
	.46975+00	.36027-02	.30541+00	.22973+00	.85450-04	.14215-02	.34798-07	.17148+02	
3	.10436+04	.48744+02	.12778+02	.28967+01	-.82759+00	.51301+03	.17853+00	.42648-01	-.6954-01
	.42303+00	.44646-02	.33989+00	.23094+00	.11603-03	.15525-02	.29705-07	.17536+02	
4	.10130+04	.47542+02	.12480+02	.41628+01	-.86147+00	.49767+03	.25698+00	.42848-01	-.4128-01
	.39406+00	.54206-02	.37650+00	.22201+00	.14806-03	.19127-02	.22255-07	.17943+02	
5	.95947+03	.48637+02	.12182+02	.61627+01	-.56573+00	.49035+03	.38098+00	.46044-01	-.2400-01
	.36833+00	.58267-02	.38755+00	.23649+00	.17383-03	.16243-02	.24320-07	.18113+02	
6	.86776+03	.47964+02	.11234+02	.88185+01	-.42399+00	.49736+03	.56104+00	.47571-01	-.3341-01
	.33437+00	.59456-02	.40319+00	.23486+00	.18073-03	.14507-02	.25466-07	.18292+02	
7	.76991+03	.47029+02	.10457+02	.10543+02	-.30947+00	.51108+03	.64046+00	.51266-01	-.5527-01
	.30695+00	.54320-02	.40362+00	.23223+00	.15850-03	.16170-02	.20968-07	.18287+02	
8	.69588+03	.46694+02	.95226+01	.12828+02	-.73520-01	.51144+03	.89750+00	.54880-01	-.5148-01
	.32084+00	.62090-02	.44095+00	.23023+00	.20171-03	.14872-02	.19245-07	.18749+02	
9	.60449+03	.45919+02	.86620+01	.14713+02	.13650+00	.50822+03	.98312+00	.60056-01	-.3977-01
	.24229+00	.74283-02	.47979+00	.22888+00	.26271-03	.13570-02	.17800-07	.19261+02	
10	.51228+03	.44692+02	.77380+01	.16323+02	.39180+00	.50770+03	.11276+01	.66294-01	-.3239-01
	.25117+00	.80587-02	.51109+00	.22814+00	.30985-03	.12282-02	.15428-07	.19692+02	
11	.42649+03	.43256+02	.67711+01	.17517+02	.91065+00	.51171+03	.12391+01	.74612-01	-.3382-01
	.23456+00	.78518-02	.52802+00	.22815+00	.31354-03	.11027-02	.14776-07	.19925+02	
12	.34138+03	.41295+02	.57933+01	.18743+02	.14433+01	.51583+03	.13641+01	.85869-01	-.3392-01
	.21751+00	.76395-02	.54540+00	.22816+00	.31732-03	.97393-03	.14046-07	.20170+02	

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10479+04	.47788+02	.12577+02	.00000	-.17076+00	.54481+03	.97763-02	.37342-01	-.1297+00
	.49967+00	.27644-02	.27053+00	.23059+00	.60086-04	.13691-02	.35493-07	.16781+02	
3	.10438+04	.46180+02	.12569+02	.24412+01	-.64151+00	.53783+03	.14587+00	.37317-01	-.1169+00
	.47449+00	.32361-02	.28970+00	.23111+00	.74193-04	.13779-02	.35073-07	.16983+02	

4	.10086+04	.48852+02	.12244+02	.43269+01	-.63269+00	.52473+03	.25744+00	.37509-01	-.4212-01
	.44139+00	.42055-02	.32611+00	.22657+00	.10316-03	.17693-02	.27255-07	.17373+02	
5	.96640+03	.47294+02	.12154+02	.43949+01	-.20928+00	.52908+03	.37907+00	.43289-01	-.9479-01
	.43070+00	.37762-02	.33867+00	.23317+00	.93107-04	.15842-02	.27536-07	.17434+02	
6	.86359+03	.46812+02	.11135+02	.37116+01	-.12441+00	.53031+03	.52470+00	.41625-01	-.9392-01
	.41154+00	.40127-02	.35243+00	.23243+00	.10136-03	.14690-02	.26169-07	.17652+02	
7	.79003+03	.46624+02	.10332+02	.10151+01	-.31152-01	.53874+03	.61451+00	.44658-01	-.1063+00
	.40794+00	.37702-02	.35384+00	.23146+00	.72659-04	.14148-02	.25646-07	.17684+02	
8	.68317+03	.46329+02	.92631+01	.12112+02	.72429-01	.53910+03	.70001+00	.48020-01	-.1025+00
	.38306+00	.40964-02	.39077+00	.23070+00	.10566-03	.12496-02	.25640-07	.17990+02	
9	.59424+03	.44762+02	.83817+01	.13977+02	.23667+00	.53523+03	.89310+00	.52549-01	-.9036-01
	.34524+00	.47222-02	.41863+00	.23009+00	.13177-03	.11641-02	.23143-07	.18445+02	
10	.49623+03	.43714+02	.73556+01	.15684+02	.39654+00	.53103+03	.10380+01	.58008-01	-.7661-01
	.31130+00	.52328-02	.45253+00	.22967+00	.15884-03	.11148-02	.20881-07	.18873+02	
11	.40864+03	.41777+02	.64547+01	.16674+02	.86236+00	.53214+03	.11441+01	.65286-01	-.7115-01
	.29127+00	.48578-02	.47286+00	.22987+00	.15045-03	.99029-03	.19536-07	.19129+02	
12	.32633+03	.39948+02	.55335+01	.18068+02	.13442+01	.53328+03	.13622+01	.75135-01	-.6594-01
	.27082+00	.44748-02	.49362+00	.23008+00	.14189-03	.86315-03	.18143-07	.19399+02	

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10506+04	.45943+02	.13603+02	.00000	-.73611-01	.50403+03	.43815-02	.32007-01	-.4564-01
	.44110+00	.31730-02	.32397+00	.23035+00	.71432-04	.13332-02	.26133-07	.17345+02	
3	.10487+04	.46358+02	.13350+02	.17639+01	-.40211+00	.51376+03	.10683+00	.31986-01	-.6553-01
	.45090+00	.31036-02	.31412+00	.23060+00	.69648-04	.11995-02	.30565-07	.17236+02	
4	.10129+04	.47384+02	.12635+02	.42642+01	-.44058+00	.52461+03	.26233+00	.32151-01	-.8820-01
	.44996+00	.34030-02	.31586+00	.22913+00	.80954-04	.14977-02	.28740-07	.17259+02	
5	.96326+03	.46737+02	.12173+02	.62163+01	.50395-01	.52984+03	.34778+00	.34533-01	-.9524-01
	.44604+00	.33260-02	.31835+00	.23079+00	.76939-04	.14144-02	.28010-07	.17288+02	
6	.86576+03	.46581+02	.11436+02	.81776+01	.51960-01	.52787+03	.49146+00	.35678-01	-.8614-01
	.42264+00	.33734-02	.34169+00	.23071+00	.79673-04	.12916-02	.26884-07	.17540+02	
7	.75205+03	.44718+02	.10567+02	.95470+01	.11539+00	.52846+03	.58061+00	.38450-01	-.8377-01
	.41143+00	.33165-02	.35342+00	.23060+00	.77605-04	.11532-02	.26964-07	.17667+02	
8	.67583+03	.43913+02	.99269+01	.11169+02	.18428+00	.52771+03	.69198+00	.41160-01	-.7826-01
	.39119+00	.34145-02	.37374+00	.23055+00	.81728-04	.10222-02	.27048-07	.17896+02	
9	.57732+03	.43219+02	.83318+01	.12675+02	.28289+00	.52823+03	.81549+00	.45042-01	-.7488-01
	.36618+00	.36479-02	.37871+00	.23042+00	.91203-04	.95599-03	.25459-07	.18189+02	
10	.48179+03	.41493+02	.73999+01	.14612+02	.39066+00	.52772+03	.96214+00	.49721-01	-.6643-01
	.33745+00	.35987-02	.42755+00	.23042+00	.93989-04	.89055-03	.23086-07	.18536+02	
11	.39611+03	.40314+02	.63673+01	.15813+02	.74555+00	.52683+03	.10557+01	.55959-01	-.5962-01
	.31847+00	.34463-02	.44664+00	.23053+00	.90797-04	.81436-03	.21466-07	.18772+02	
12	.30821+03	.38055+02	.53529+01	.17090+02	.11230+01	.52586+03	.11753+01	.64401-01	-.4958-01
	.29828+00	.32842-02	.46696+00	.23066+00	.87403-04	.73332-03	.19809-07	.19029+02	

AT LINE 12

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10520+04	.44718+02	.14547+02	.00000	-.16415-01	.46263+03	.10198-02	.26673-01	.3769-01
	.38227+00	.38292-02	.38195+00	.23079+00	.95349-04	.11125-02	.24008-07	.17999+02	
3	.10415+04	.44694+02	.14170+02	.13011+01	-.15029+00	.47824+03	.80108-01	.26655-01	.7680-02
	.40356+00	.34313-02	.36077+00	.23109+00	.81176-04	.10769-02	.26012-07	.17752+02	
4	.10063+04	.45509+02	.13213+02	.40571+01	-.20099+00	.50949+03	.24246+00	.26792-01	-.5352-01
	.41179+00	.32196-02	.33240+00	.23087+00	.74041-04	.14385-02	.24920-07	.17440+02	
5	.94634+03	.44782+02	.12710+02	.58537+01	.17290+00	.51044+03	.36235+00	.28778-01	-.5244-01
	.42521+00	.31507-02	.33885+00	.23137+00	.72438-04	.13524-02	.24218-07	.17510+02	
6	.85765+03	.44562+02	.11618+02	.76243+01	.99891-01	.51490+03	.48251+00	.29732-01	-.5815-01
	.41500+00	.32411-02	.34835+00	.23133+00	.75472-04	.14082-02	.22787-07	.17618+02	

7	.77335+03	.43694+02	.15836+02	.93947+01	.21017+00	.50784+03	.34287+03	.32041-01	-.1192-01
	.34534+00	.33117-02	.37027+00	.23129+00	.78432-04	.11595-02	.23567-07	.17361+02	
8	.66329+03	.42449+02	.97153+01	.10495+02	.27960+00	.49663+03	.64767+03	.34300-01	-.1819-01
	.34334+00	.34701-02	.49053+00	.23108+00	.85586-04	.10016-02	.22734-07	.18212+02	
9	.55706+03	.41781+02	.84203+01	.12017+02	.35263+00	.50055+03	.77029+00	.37535-01	-.1944-01
	.34947+00	.34350-02	.41536+00	.23107+00	.86373-04	.87048-03	.23140-07	.18384+02	
10	.46569+03	.40719+02	.73141+01	.13734+02	.44452+00	.50746+03	.90510+00	.41434-01	-.2743-01
	.33375+00	.33599-02	.43079+00	.23120+00	.85763-04	.80844-03	.22495-07	.18574+02	
11	.37959+03	.37687+02	.63066+01	.14760+02	.69007+00	.50715+03	.10069+01	.46633-01	-.2058-01
	.31877+00	.30457-02	.44898+00	.23141+00	.77800-04	.71466-03	.21046-07	.18797+02	
12	.29793+03	.37073+02	.53134+01	.16238+02	.95026+00	.50681+03	.11232+01	.53668-01	-.1255-01
	.29672+00	.27127-02	.46825+00	.23163+00	.69362-04	.61528-03	.19676-07	.19039+02	

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10609+04	.42349+02	.17001+02	.00000	.42822-01	.36353+03	.30013-02	.21338-01	.2338+00
	.24883+00	.60956-02	.51609+00	.22804+00	.20559-03	.74424-03	.17349-07	.19722+02	
3	.10407+04	.42244+02	.16476+02	.99542+00	-.12564+00	.37606+03	.69185-01	.21324-01	.2099+00
	.24781+00	.59623-02	.49739+00	.22837+00	.17275-03	.79874-03	.17371-07	.19458+02	
4	.10102+04	.43201+02	.15253+02	.35248+01	-.85759-01	.40856+03	.21488+00	.21434-01	.1459+00
	.30289+00	.49917-02	.46257+00	.22826+00	.14665-03	.11371-02	.16677-07	.18997+02	
5	.95060+03	.42489+02	.14717+02	.49957+01	.10207+00	.40423+03	.31736+00	.23022-01	.1566+00
	.29130+00	.50072-02	.47470+00	.22785+00	.14996-03	.99533-03	.16791-07	.19151+02	
6	.86258+03	.42381+02	.13327+02	.65847+01	.50343-01	.41702+03	.44255+00	.23786-01	.1334+00
	.29744+00	.47605-02	.46857+00	.22793+00	.13864-03	.11557-02	.15480-07	.19071+02	
7	.77437+03	.41520+02	.12409+02	.80582+01	.17055+00	.40959+03	.55463+00	.25633-01	.1509+00
	.27485+00	.49016-02	.49110+00	.22801+00	.14927-03	.99174-03	.15113-07	.19368+02	
8	.65740+03	.40166+02	.11173+02	.92767+01	.24119+00	.39147+03	.66451+00	.27440-01	.1899+00
	.23864+00	.52081-02	.52684+00	.22809+00	.17372-03	.86072-03	.13254-07	.19864+02	
9	.53096+03	.39226+02	.96497+01	.10511+02	.28100+00	.39520+03	.76208+00	.30028-01	.1864+00
	.23119+00	.49178-02	.53447+00	.22856+00	.16577-03	.69873-03	.14520-07	.19965+02	
10	.45572+03	.38119+02	.82527+01	.12067+02	.34806+00	.40591+03	.88577+00	.33147-01	.1705+00
	.22674+00	.44186-02	.53934+00	.22877+00	.14668-03	.58797-03	.15205-07	.20026+02	
11	.36841+03	.36666+02	.70147+01	.13226+02	.51951+00	.40707+03	.98955+00	.37306-01	.1732+00
	.21461+00	.39642-02	.55174+00	.22904+00	.13333-03	.51174-03	.14559-07	.20198+02	
12	.28500+03	.34659+02	.58196+01	.14469+02	.70676+00	.40834+03	.11113+01	.42934-01	.1773+00
	.20136+00	.34680-02	.56629+00	.22934+00	.11874-03	.42848-03	.13791-07	.20389+02	

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10922+04	.41060+02	.18195+02	.00000	.11314+00	.31148+03	.86665-02	.16004-01	.3366+00
	.17539+00	.86734-02	.58507+00	.22949+00	.40052-03	.98065-03	.86094-08	.20791+02	
3	.10317+04	.41029+02	.17853+02	.91570+00	-.27807-01	.31921+03	.68566-01	.15993-01	.3218+00
	.18690+00	.78487-02	.57426+00	.22971+00	.31594-03	.96601-03	.93509-08	.20611+02	
4	.10006+04	.41563+02	.16955+02	.32494+01	.85641-01	.33250+03	.24013+00	.16075-01	.2957+00
	.19667+00	.79094-02	.56396+00	.23003+00	.32771-03	.10933-02	.92865-08	.20460+02	
5	.93696+03	.40726+02	.16402+02	.44478+01	.16055+00	.32303+03	.31610+00	.17267-01	.3161+00
	.17507+00	.83218-02	.57969+00	.23159+00	.38262-03	.94077-03	.89303-08	.20709+02	
6	.85080+03	.40650+02	.14656+02	.60228+01	.13202+00	.34275+03	.44682+00	.17839-01	.2790+00
	.19627+00	.74074-02	.56347+00	.23153+00	.29904-03	.10282-02	.95843-08	.20449+02	
7	.76551+03	.39551+02	.13702+02	.74367+01	.23611+00	.33533+03	.54686+00	.19225-01	.2963+00
	.17525+00	.77496-02	.58413+00	.23146+00	.36367-03	.96501-03	.85012-08	.20769+02	
8	.69232+03	.38857+02	.12273+02	.85929+01	.26055+00	.31787+03	.68542+00	.20580-01	.3340+00
	.14274+00	.83088-02	.61654+00	.23171+00	.42820-03	.79199-03	.68671-08	.21281+02	
9	.54121+03	.37363+02	.10647+02	.96292+01	.30742+00	.31854+03	.74042+00	.22521-01	.3359+00
	.13479+00	.78459-02	.62485+00	.23173+00	.39966-03	.62696-03	.75741-08	.21409+02	

10	.43956+03	.36153+02	.89641+01	.11076+02	.34085+00	.32896+03	.97730+00	.37660-01	.3221+00
	.13360+00	.66757-02	.62577+00	.23267+00	.33945-03	.54273-03	.76999-09	.21412+02	
11	.35319+03	.34731+02	.75775+01	.12161+02	.44742+00	.33089+03	.14151+01	.27480-01	.3213+00
	.12517+00	.61376-02	.63441+00	.23347+00	.31927-03	.47447-03	.72582-08	.21544+02	
12	.27066+03	.32718+02	.62326+01	.13345+02	.56561+00	.33263+03	.11440+01	.32201-01	.3235+00
	.11559+00	.53600-02	.64403+00	.23435+00	.29684-03	.37864-03	.68209-08	.21692+02	

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10547+04	.34112+02	.24928+02	.00000	.23639-01	.19501+03	.29621-02	.10669-01	.5731+00
	.34430-01	.20194-01	.71979+00	.21950+00	.37460-02	.27524-03	.23247-08	.23354+02	
3	.10519+04	.34167+02	.24709+02	.78088+00	-.62811-01	.19779+03	.74496-01	.10662-01	.5676+00
	.39466-01	.18957-01	.71731+00	.22075+00	.32774-02	.24099-03	.31241-08	.23274+02	
4	.10191+04	.34567+02	.23714+02	.24789+01	.53009-01	.20187+03	.23499+00	.10717-01	.5596+00
	.40233-01	.20617-01	.71554+00	.21932+00	.39775-02	.31607-03	.27013-08	.23285+02	
5	.95471+03	.33477+02	.23161+02	.32583+01	.21823-01	.19303+03	.31780+00	.11511-01	.5786+00
	.29607-01	.23936-01	.72394+00	.21596+00	.61123-02	.24592-03	.21713-08	.23548+02	
6	.86224+03	.33872+02	.22470+02	.45616+01	.32513-01	.20576+03	.44613+00	.11893-01	.5541+00
	.38363-01	.20556-01	.71691+00	.21939+00	.45055-02	.25411-03	.33312-08	.23320+02	
7	.77319+03	.33042+02	.18979+02	.56548+01	.10655+00	.20294+03	.56383+00	.12817-01	.5617+00
	.30625-01	.22611-01	.72379+00	.21693+00	.58098-02	.23505-03	.26629-08	.23514+02	
8	.69730+03	.31330+02	.17036+02	.65602+01	.11946+00	.19257+03	.67041+00	.13720-01	.5852+00
	.18301-01	.28970-01	.73347+00	.20881+00	.10282-01	.16793-03	.20613-08	.23904+02	
9	.63983+03	.30392+02	.14741+02	.72927+01	.77330-01	.19122+03	.76959+00	.15014-01	.5901+00
	.14941-01	.30716-01	.73627+00	.20502+00	.12927-01	.12461-03	.24482-08	.24040+02	
10	.43695+03	.29447+02	.12355+02	.83786+01	.15430+00	.19499+03	.88564+00	.16574-01	.5856+00
	.13269-01	.30630-01	.73785+00	.20381+00	.14338-01	.10491-03	.24863-08	.24097+02	
11	.34722+03	.28301+02	.10272+02	.92162+01	.22164+00	.19615+03	.99381+00	.18653-01	.5863+00
	.11659-01	.31602-01	.73958+00	.20087+00	.16802-01	.93437-04	.23130-08	.24197+02	
12	.26366+03	.26736+02	.83139+01	.10176+02	.29880+00	.19749+03	.11272+01	.21467-01	.5877+00
	.85266-02	.32716-01	.74156+00	.19749+00	.19626-01	.80289-04	.21156-08	.24312+02	

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10219+04	.27742+02	.31831+02	.00000	.18386+00	.13881+03	.20855-01	.53345-02	.6925+00
	.30834-02	.51139-01	.73973+00	.16948+00	.36556-01	.34775-04	.13542-08	.24959+02	
3	.10311+04	.27736+02	.32231+02	.70327+00	.98138-01	.13767+03	.80946-01	.53310-02	.6948+00
	.31646-02	.50760-01	.73965+00	.16495+00	.41229-01	.43940-04	.99241-09	.25046+02	
4	.99135+03	.27569+02	.31389+02	.19758+01	.21292+00	.13597+03	.25941+00	.53584-02	.6986+00
	.26804-02	.54315-01	.73662+00	.15509+00	.49250-01	.48922-04	.95567-09	.25252+02	
5	.91637+03	.27776+02	.30391+02	.25814+01	.17486+00	.13184+03	.34501+00	.57556-02	.7081+00
	.18043-02	.56687-01	.73832+00	.14704+00	.55910-01	.36150-04	.80648-09	.25434+02	
6	.82855+03	.27226+02	.26581+02	.36412+01	.21069+00	.13922+03	.42330+00	.59464-02	.6935+00
	.25065-02	.55452-01	.73819+00	.15448+00	.49326-01	.43125-04	.99810-09	.25268+02	
7	.74068+03	.26541+02	.24635+02	.44917+01	.23738+00	.13674+03	.53416+00	.64083-02	.6999+00
	.16771-02	.56463-01	.73860+00	.14376+00	.59466-01	.37200-04	.75550-09	.25503+02	
8	.63365+03	.25591+02	.22132+02	.52201+01	.17463+00	.13185+03	.64276+00	.68600-02	.7113+00
	.11145-02	.56506-01	.73924+00	.12721+00	.75897-01	.27045-04	.62642-09	.25857+02	
9	.52088+03	.24929+02	.18781+02	.58691+01	.17491+00	.13084+03	.72755+00	.75070-02	.7147+00
	.86960-03	.55605-01	.73987+00	.12127+00	.82174-01	.21156-04	.74577-09	.25988+02	
10	.42133+03	.24490+02	.15511+02	.66876+01	.18697+00	.13378+03	.84704+00	.82868-02	.7105+00
	.76334-03	.54555-01	.74052+00	.11823+00	.85901-01	.19875-04	.74730-09	.26054+02	
11	.33926+03	.23875+02	.12892+02	.73508+01	.19188+00	.13479+03	.95060+00	.93266-02	.7101+00
	.61693-03	.53644-01	.74107+00	.11357+00	.91042-01	.18124-04	.69943-09	.26156+02	
12	.25384+03	.22960+02	.10064+02	.81395+01	.19533+00	.13599+03	.10728+01	.10734-01	.7102+00
	.44134-03	.52651-01	.74174+00	.10800+00	.97157-01	.16043-04	.65284-09	.26282+02	

AT LINE 17

	P	T	RHO	U	V	E	M	Z	CF	CM
	N	N0	N2	O	O2	NO+	E-			
2	.10594+04	.10511+02	.10079+03	.00000	.00000	.26000+02	.00000	.11924-08	.0000	-.8499-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
3	.10645+04	.10511+02	.10127+03	.00000	.00000	.26000+02	.00000	.11916-08	-.3927-02	-.8463-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
4	.10360+04	.10511+02	.98749+02	.00000	.00000	.26000+02	.00000	.11977-08	-.1043-01	-.8258-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
5	.94973+03	.10511+02	.90354+02	.00000	.00000	.26000+02	.00000	.12865-08	-.1265-01	-.7316-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
6	.85935+03	.10511+02	.81756+02	.00000	.00000	.26000+02	.00000	.13291-08	-.1733-01	-.7317-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
7	.76733+03	.10511+02	.73001+02	.00000	.00000	.26000+02	.00000	.14324-08	-.1977-01	-.6492-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
8	.69834+03	.10511+02	.66406+02	.00000	.00000	.26000+02	.00000	.15333-08	-.2153-01	-.5760-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
9	.63162+03	.10511+02	.60576+02	.00000	.00000	.26000+02	.00000	.16780-08	-.2187-01	-.5036-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
10	.42561+03	.10511+02	.40482+02	.00000	.00000	.26000+02	.00000	.18522-08	-.2282-01	-.4464-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
11	.33411+03	.10511+02	.31786+02	.00000	.00000	.26000+02	.00000	.20846-08	-.2228-01	-.3825-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
12	.25212+03	.10511+02	.23985+02	.00000	.00000	.26000+02	.00000	.23991-08	-.2146-01	-.3134-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		

STEP 0, TIME= .1021-03, STANDOFF DISTANCE= .7997-01
AMAX= .2268+00, AMIN= -.8292-01, ARANGE= .3117+00, MAXIM PRESS= .1064+04
1.02065-04 1.02065-07

STEP 1, TIME= .2040-03, STANDOFF DISTANCE= .7996-01
AMAX= .2046+00, AMIN= -.1078+00, ARANGE= .3124+00, MAXIM PRESS= .1062+04
1.01963-04 1.01963-04

STEP 2, TIME= .3059-03, STANDOFF DISTANCE= .7995-01
AMAX= .1916+00, AMIN= -.1240+00, ARANGE= .3156+00, MAXIM PRESS= .1059+04
1.01884-04 1.01884-04

STEP 3, TIME= .4077-03, STANDOFF DISTANCE= .7994-01
AMAX= .1845+00, AMIN= -.1352+00, ARANGE= .3197+00, MAXIM PRESS= .1056+04
1.01815-04 1.01815-04

STEP 4, TIME= .5095-03, STANDOFF DISTANCE= .7992-01
AMAX= .1813+00, AMIN= -.1428+00, ARANGE= .3241+00, MAXIM PRESS= .1054+04
1.01755-04 1.01755-04

STEP 5, TIME= .6112-03, STANDOFF DISTANCE= .7990-01
AMAX= .1805+00, AMIN= -.1479+00, ARANGE= .3284+00, MAXIM PRESS= .1050+04
1.01702-04 1.01702-04

STEP 6, TIME= .7128-03, STANDOFF DISTANCE= .7987-01
AMAX= .1807+00, AMIN= -.1513+00, ARANGE= .3320+00, MAXIM PRESS= .1047+04
1.01657-04 1.01657-04

STEP 7, TIME= .8145-03, STANDOFF DISTANCE= .7984-01
AMAX= .2095+00, AMIN= -.1534+00, ARANGE= .3629+00, MAXIM PRESS= .1044+04
1.01616-04 1.01616-04

AT STEP 200 DT1= .2973614-03 DT2= .5530266-03 AT L= 4, M= 7
TIME= .1977328-01

	Y	SHOCK VELOCITY	SY	ZS	YS
2	.10000	-.10824-01	.00000	.10783+01	.77680-10
3	.10000+00	-.87714-01	.94346-02	.10741+01	.10795+00
4	.20000+00	.80302-01	.26329-01	.10585+01	.21550+00
5	.30000+00	-.69891-02	.50591-01	.10356+01	.32270+00
6	.40000+00	-.22822+00	.13446-01	.10026+01	.42844+00
7	.50000+00	.33087-01	.11166+00	.95106+00	.52734+00
8	.60000+00	-.32352-01	.16412+00	.91247+00	.63692+00
9	.70000+00	-.47285-01	.66367-01	.84737+00	.73229+00
10	.80000+00	-.37132-01	.11524+00	.77265+00	.82525+00
11	.90000+00	-.28571-01	.16443+00	.68878+00	.91310+00
12	.10000+01	-.17729-01	.19671+00	.59664+00	.99909+00

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.96968+03	.11886+03	.81564+01	.32976-07	-.40836+01	.43472+03	.24366+00	.78299-01	.5829-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.95713+03	.11744+03	.81500+01	.30506+01	-.41059+01	.43591+03	.33263+00	.79487-01	.4585-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.94544+03	.11612+03	.81421+01	.58733+01	-.37966+01	.44208+03	.46731+00	.80195-01	-.4141-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.90920+03	.11202+03	.81172+01	.84610+01	-.35488+01	.44368+03	.61182+00	.84762-01	.3689-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.81624+03	.10142+03	.80485+01	.12697+02	-.38463+01	.44838+03	.93387+00	.90289-01	.1098-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.82761+03	.10270+03	.80572+01	.13114+02	-.23303+01	.45407+03	.93116+00	.87496-01	-.1578-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
8	.78695+03	.98062+02	.80254+01	.14739+02	-.13762+01	.45699+03	.10613+01	.11278+00	.1519-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
9	.63321+03	.80285+02	.78870+01	.19677+02	-.17291+01	.47450+03	.15791+01	.12060+00	.2001-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
10	.55992+03	.71717+02	.78073+01	.21726+02	-.78739+00	.48336+03	.18483+01	.13049+00	.1472-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
11	.50457+03	.65684+02	.76819+01	.23109+02	.63079+00	.48962+03	.20715+01	.14375+00	.1070-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
12	.43166+03	.56912+02	.75847+01	.24758+02	.19218+01	.49865+03	.24054+01	.16368+00	.6123-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.91668+03	.10708+03	.86969+01	.00000	-.34977+01	.49041+03	.21239+00	.73080-01	-.8282-01
	.21552+00	.46416-01	.52708+00	.17704+00	.31837-01	.30407-03	.67674-08	.20885+02	
3	.97385+03	.90267+02	.86716+01	.29871+01	-.34972+01	.46482+03	.28223+00	.74188-01	-.6960-01
	.20551+00	.49269-01	.54030+00	.17226+00	.32617-01	.18810-04	.18597-07	.21087+02	
4	.95742+03	.79449+02	.86865+01	.57442+01	-.32647+01	.46507+03	.41086+00	.74849-01	-.6640-01
	.19025+00	.51204-01	.55010+00	.17429+00	.34107-01	.59807-04	.18712-07	.21313+02	
5	.91407+03	.78597+02	.85819+01	.79531+01	-.30622+01	.44703+03	.51057+00	.79111-01	-.8571-01
	.19364+00	.50344-01	.54937+00	.17258+00	.33488-01	.17727-03	.29360-07	.21271+02	
6	.81866+03	.75406+02	.85022+01	.12542+02	-.33771+01	.49226+03	.85941+00	.84270-01	-.6085-01
	.14336+00	.56354-01	.59820+00	.16076+00	.41120-01	.16739-03	.10296-07	.22310+02	
7	.81866+03	.75729+02	.85027+01	.13068+02	-.29102+01	.49851+03	.87142+00	.81663-01	-.7317-01
	.14639+00	.56101-01	.59575+00	.16000+00	.41168-01	.23317-03	.10183-07	.22267+02	

8	.72695+03	.62316+02	.63.65+01	.19457+02	-.21679+01	.00063+03	.87238+00	.13526+00	-.2976+00	
	.22942+00	.47227-01	.51572+01	.37462+00	.32630-01	.28141-03	.16099-07	.20688+02		
9	.62284+03	.67512+02	.75860+01	.18854+02	-.14976+01	.50545+03	.13690+01	.11256+00	-.6409-01	
	.61357-01	.63322-01	.69651+00	.14639+00	.52402-01	.25361-04	.55694-08	.23725+02		
10	.55148+03	.61951+02	.77189+01	.21005+02	-.61676+00	.49649+03	.14919+01	.12179+00	-.2149-01	
	.39995-01	.66917-01	.69665+00	.12481+00	.72125-01	.00000	.61616-06	.25011+02		
11	.45135+03	.57764+02	.75497+01	.22455+02	.69820+00	.49874+03	.19126+01	.13417+00	-.1425-01	
	.24799-01	.65098-01	.71216+00	.11172+00	.86212-01	.00000	.54531-08	.25610+02		
12	.41583+03	.53389+02	.72564+01	.23682+02	.18136+01	.50072+03	.21965+01	.15277+00	-.6717-02	
	.12523-01	.63555-01	.72935+00	.10061+00	.98163-01	.00000	.48519-08	.26142+02		

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10062+04	.71218+02	.91923+01	.00000	-.30984+01	.54307+03	.17846+00	.67860-01	-.1738+00
	.33564+00	.27226-01	.41850+00	.21336+00	.41005-02	.11668-02	.12767-07	.18750+02	
3	.99654+03	.70810+02	.91603+01	.26011+01	-.31327+01	.54430+03	.24584+00	.68689-01	-.1747+00
	.33370+00	.27318-01	.41970+00	.21372+00	.41732-02	.13853-02	.87425-08	.18774+02	
4	.97482+03	.70396+02	.91517+01	.56242+01	-.29189+01	.53915+03	.37166+00	.69502-01	-.1815+00
	.31343+00	.29591-01	.43678+00	.21237+00	.46715-02	.11487-02	.10387-07	.19047+02	
5	.94305+03	.69769+02	.88810+01	.74919+01	-.25477+01	.55554+03	.46185+00	.73460-01	-.1908+00
	.32916+00	.27644-01	.42910+00	.21371+00	.42171-02	.11693-02	.20661-07	.18887+02	
6	.84326+03	.67048+02	.87796+01	.12459+02	-.29432+01	.53470+03	.80402+00	.78250-01	-.1347+00
	.23990+00	.37321-01	.50680+00	.20657+00	.66528-02	.75810-03	.10238-07	.20123+02	
7	.83974+03	.66617+02	.89857+01	.13093+02	-.17596+01	.51913+03	.84946+00	.75830-01	-.1019+00
	.21515+00	.41770-01	.53335+00	.20137+00	.76733-02	.67546-03	.10908-07	.20552+02	
8	.72932+03	.70401+02	.65594+01	.13599+02	-.17258+01	.64894+03	.77759+00	.97741-01	-.3662+00	
	.34347+00	.25154-01	.39335+00	.21277+00	.40884-02	.11765-02	.20099-07	.18406+02	
9	.62379+03	.61759+02	.73923+01	.17838+02	-.10843+01	.54692+03	.12104+01	.10452+00	-.1392+00	
	.18007+00	.41662-01	.56604+00	.20116+00	.84632-02	.60410-03	.12670-07	.21097+02	
10	.54397+03	.57618+02	.74977+01	.20253+02	-.45404+00	.51512+03	.15377+01	.11309+00	-.5716-01	
	.91879-01	.60311-01	.69746+00	.18269+00	.17420-01	.24396-03	.44005-08	.22905+02		
11	.47767+03	.54343+02	.72407+01	.21783+02	.70669+00	.51061+03	.17624+01	.12458+00	-.3726-01	
	.59626-01	.69197-01	.67549+00	.16962+00	.25748-01	.11330-03	.40751-08	.23751+02		
12	.39654+03	.50426+02	.66966+01	.23114+02	.17162+01	.50669+03	.20074+01	.14186+00	-.1850-01	
	.31571-01	.70928-01	.69988+00	.15863+00	.32992-01	-.35356-06	.37920-08	.24539+02		

AT LINE 5

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10209+04	.64043+02	.98649+01	.00000	-.26350+01	.55934+03	.14935+00	.62640-01	-.1919+00
	.40118+00	.15152-01	.36113+00	.22159+00	.80090-03	.11583-02	.31443-07	.17865+02	
3	.10086+04	.63638+02	.99436+01	.27761+01	-.26072+01	.54830+03	.21680+00	.63590-01	-.1688+00
	.38133+00	.15102-01	.37514+00	.22559+00	.87231-03	.19649-02	.20411-07	.18068+02	
4	.98442+03	.63080+02	.99329+01	.54404+01	-.25159+01	.54304+03	.34955+00	.64156-01	-.1551+00	
	.36472+00	.16193-01	.39811+00	.21816+00	.97247-03	.18228-02	.18218-07	.18332+02	
5	.95970+03	.63058+02	.99264+01	.70000+01	-.20689+01	.57971+03	.41476+00	.67809-01	-.2260+00
	.40264+00	.13432-01	.35799+00	.22343+00	.74789-03	.17568-02	.35604-07	.17830+02	
6	.84707+03	.61049+02	.93000+01	.12150+02	-.25718+01	.53982+03	.77008+00	.72231-01	-.1349+00	
	.28635+00	.21572-01	.46692+00	.22022+00	.15289-02	.14173-02	.13089-07	.19312+02	
7	.84975+03	.60179+02	.10076+02	.13050+02	-.14539+01	.46736+03	.87943+00	.69996-01	-.2846-01	
	.20249+00	.32532-01	.54642+00	.21507+00	.27809-02	.71126-03	.76335-08	.20572+02	
8	.72266+03	.64844+02	.67405+01	.13082+02	-.15389+01	.66875+03	.72961+00	.90222-01	-.3959+00	
	.43879+00	.13027-01	.31966+00	.22577+00	.77604-03	.19742-02	.24636-07	.17417+02	
9	.61935+03	.58272+02	.69787+01	.16674+02	-.84467+00	.61042+03	.10280+01	.96483-01	-.2577+00	
	.31404+00	.17030-01	.44314+00	.22310+00	.11829-02	.15041-02	.21619-07	.18912+02	
10	.55301+03	.54679+02	.71287+01	.19329+02	-.35322+00	.54289+03	.13092+01	.10440+00	-.1111+00	
	.16723+00	.33259-01	.58307+00	.21190+00	.37712-02	.77341-03	.12621-07	.21155+02	

11	.96321*03	.52245*02	.66645*01	.20963*02	.66987*00	.52396*03	.14075*01	.11500*00	-.6345-01
	.10654*00	.45415-01	.63795*00	.23207*00	.71444-02	.47779-03	.66778-08	.22321*02	
12	.38161*03	.46965*02	.63374*01	.22394*02	.15658*01	.50736*03	.10771*01	.13095*00	-.2109-01
	.54135-01	.50059-01	.68002*00	.19347*00	.10096-01	.21690-03	.12948-08	.23454*02	

AT LINE 6

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10376*04	.59800*02	.10628*02	.00000	-.21909*01	.55299*03	.12477*00	.57420-01	-.1704*00
	.41709*00	.96561-02	.34267*00	.22764*00	.35897-03	.23870-02	.22366-07	.17636*02	
3	.10308*04	.59555*02	.10555*02	.27068*01	-.22559*01	.56144*03	.19983*00	.58291-01	-.1857*00
	.42562*00	.91952-02	.33769*00	.22545*00	.33469-03	.17973-02	.27646-07	.17559*02	
4	.95778*03	.59110*02	.10556*02	.52464*01	-.22101*01	.54026*03	.33242*00	.58810-01	-.1419*00
	.38371*00	.11170-01	.37535*00	.22776*00	.44461-03	.15656-02	.27636-07	.18013*02	
5	.96398*03	.59736*02	.99572*01	.67526*01	-.17438*01	.58410*03	.39390*00	.62158-01	-.2285*00
	.43805*00	.65495-02	.32393*00	.22733*00	.30012-03	.18424-02	.41239-07	.17398*02	
6	.85918*03	.57816*02	.94646*01	.11515*02	-.21214*01	.56869*03	.69966*00	.66212-01	-.1863*00
	.35865*00	.11693-01	.40319*00	.22406*00	.48018-03	.17157-02	.26673-07	.18338*02	
7	.85134*03	.56247*02	.10716*02	.12963*02	-.12720*01	.47638*03	.87966*00	.64163-01	.1435*03
	.21000*00	.24296-01	.54665*00	.21793*00	.15099-02	.10242-02	.87795-08	.20407*02	
8	.72962*03	.60666*02	.71534*01	.12966*02	-.12391*01	.66551*03	.79233*00	.82704-01	-.3806*00
	.44426*00	.87589-02	.29623*00	.22802*00	.33658-03	.23970-02	.25365-07	.17124*02	
9	.62670*03	.56744*02	.67153*01	.15737*02	-.52544*00	.66814*03	.98198*00	.88443-01	-.3703*00
	.43384*00	.73313-02	.32686*00	.22754*00	.24888-03	.21730-02	.27385-07	.17450*02	
10	.52336*03	.52673*02	.66604*01	.18418*02	-.22906*00	.59474*03	.11938*01	.95696-01	-.2108*00
	.27912*00	.14748-01	.48060*00	.22324*00	.81220-03	.14801-02	.18199-07	.19367*02	
11	.45020*03	.50703*02	.63536*01	.20124*02	.64295*00	.56232*03	.14188*01	.10542*00	-.1390*00
	.19547*00	.21978-01	.56106*00	.21867*00	.17501-02	.10693-02	.13476-07	.20620*02	
12	.36379*03	.47599*02	.58041*01	.21655*02	.14257*01	.53322*03	.14808*01	.12003*00	-.7195-01
	.12056*00	.26468-01	.63329*00	.21457*00	.25920-02	.70054-03	.92348-08	.21892*02	

AT LINE 7

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10506*04	.56999*02	.11050*02	.00000	-.16239*01	.55934*03	.10321*00	.52200-01	-.1773*00
	.45356*00	.66344-02	.30888*00	.22706*00	.20094-03	.36377-02	.16394-07	.17248*02	
3	.10336*04	.56961*02	.10617*02	.26620*01	-.18828*01	.56816*03	.18458*00	.52992-01	-.1939*00
	.44152*00	.63877-02	.30136*00	.22751*00	.19143-03	.30310-02	.23712-07	.17156*02	
4	.99526*03	.55700*02	.10686*02	.49634*01	-.18965*01	.55391*03	.30671*00	.53463-01	-.1610*00
	.42596*00	.73736-02	.33563*00	.22843*00	.23699-03	.23705-02	.26569-07	.17529*02	
5	.97402*03	.55318*02	.10683*02	.66793*01	-.15331*01	.56571*03	.39327*00	.56508-01	-.1817*00
	.43140*00	.68626-02	.33111*00	.22840*00	.21090-03	.20205-02	.35991-07	.17464*02	
6	.86121*03	.55985*02	.91624*01	.10469*02	-.17756*01	.61501*03	.60037*00	.60193-01	-.2754*00
	.46062*00	.59209-02	.30188*00	.22925*00	.16472-03	.21619-02	.37241-07	.17143*02	
7	.84766*03	.53028*02	.11246*02	.12696*02	-.11627*01	.46480*03	.84994*00	.58330-01	.2831-01
	.21734*00	.18809-01	.54123*00	.22022*00	.10028-02	.13695-02	.10671-07	.20274*02	
8	.77722*03	.56048*02	.80003*01	.13036*02	-.10711*01	.61297*03	.74106*00	.75185-01	-.2662*00
	.40817*00	.65270-02	.35523*00	.22555*00	.29655-03	.22150-02	.24584-07	.17753*02	
9	.60551*03	.53513*02	.67884*01	.15058*02	-.46784*00	.65447*03	.84552*00	.80403-01	-.3378*00
	.45002*00	.56991-02	.31384*00	.22796*00	.16247-03	.23128-02	.28076-07	.17271*02	
10	.51349*03	.50688*02	.64209*01	.17460*02	-.11978*00	.62642*03	.10717*01	.86996-01	-.2707*00
	.34341*00	.76001-02	.39939*00	.22754*00	.26137-03	.17977-02	.24877-07	.18252*02	
11	.43691*03	.48999*02	.59413*01	.19191*02	.58364*00	.60014*03	.12582*01	.95835-01	-.2119*00
	.28965*00	.10442-01	.47186*00	.22612*00	.47523-03	.14563-02	.20391-07	.19193*02	
12	.34606*03	.45785*02	.52938*01	.20832*02	.12503*01	.57525*03	.14750*01	.10912*00	-.1524*00
	.21974*00	.13136-01	.54054*00	.22477*00	.67791-03	.11328-02	.16141-07	.20179*02	

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DMSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10592+04	.54915+02	.10924+02	.00000	-.14364+01	.61303+03	.77698-01	.46980-01	-.2772+00
	.54750+00	.34720-02	.21809+00	.22734+00	.84665-04	.35471-02	.23297-07	.16298+02	
3	.10451+04	.55349+02	.10902+02	.27173+01	-.16363+01	.59062+03	.17513+00	.47692-01	-.2353+00
	.51300+00	.42955-02	.24775+00	.23055+00	.11162-03	.42135-02	.16161-07	.16611+02	
4	.10067+04	.54965+02	.10674+02	.47635+01	-.16026+01	.59082+03	.29038+00	.48117-01	-.2325+00
	.50416+00	.45129-02	.26248+00	.22431+00	.11607-03	.44068-02	.15008-07	.16748+02	
5	.97501+03	.53422+02	.10676+02	.67264+01	-.12369+01	.57606+03	.39069+00	.50857-01	-.1877+00
	.44021+00	.51690-02	.30371+00	.22842+00	.14197-03	.53269-02	.32242-07	.17156+02	
6	.86111+03	.54065+02	.10456+02	.99567+01	-.14502+01	.66402+03	.59229+00	.54173-01	-.3677+00
	.56750+00	.29080-02	.20550+00	.23156+00	.69174-04	.24539-02	.41136-07	.16164+02	
7	.84120+03	.50479+02	.11317+02	.12328+02	-.94954+00	.47801+03	.82457+00	.52497-01	.6411-02
	.25629+00	.13030-01	.50171+00	.22662+00	.58575-03	.15687-02	.15467-07	.19641+02	
8	.72585+03	.53182+02	.86414+01	.13252+02	-.83504+00	.57371+03	.80380+00	.67667-01	-.1831+00
	.36509+00	.65367-02	.39565+00	.22822+00	.29302-03	.22056-02	.21776-07	.18229+02	
9	.59719+03	.50335+02	.71969+01	.14816+02	-.31428+00	.63020+03	.86810+00	.72363-01	-.2829+00
	.43032+00	.50862-02	.33190+00	.23025+00	.14161-03	.23042-02	.24432-07	.17466+02	
10	.50426+03	.46670+02	.63615+01	.16796+02	-.33516-01	.64010+03	.10047+01	.78297-01	-.2941+00
	.41075+00	.49478-02	.35191+00	.23031+00	.13711-03	.19515-02	.24745-07	.17681+02	
11	.42442+03	.47094+02	.57115+01	.18407+02	.57662+00	.62760+03	.11497+01	.86251-01	-.2630+00
	.34157+00	.57776-02	.40099+00	.22984+00	.18241-03	.16335-02	.23373-07	.18252+02	
12	.33735+03	.44699+02	.49432+01	.20030+02	.11913+01	.61542+03	.13176+01	.98210-01	-.2298+00
	.31204+00	.66136-02	.45044+00	.22937+00	.22804-03	.13131-02	.21992-07	.18867+02	

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DMSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10677+04	.53055+02	.11601+02	.00000	-.11694+01	.57818+03	.65025-01	.41760-01	-.2057+00
	.51566+00	.30501-02	.24592+00	.23127+00	.88794-04	.39851-02	.18394-07	.16585+02	
3	.10319+04	.51675+02	.11495+02	.26634+01	-.13371+01	.58366+03	.16547+00	.42393-01	-.2114+00
	.51977+00	.34974-02	.24582+00	.22739+00	.83530-04	.34433-02	.22526-07	.16565+02	
4	.95176+03	.51734+02	.11026+02	.46013+01	-.13697+01	.59126+03	.26644+00	.42771-01	-.2254+00
	.51883+00	.34967-02	.24292+00	.23092+00	.85450-04	.37492-02	.20400-07	.16550+02	
5	.87739+03	.50970+02	.11264+02	.66110+01	-.98929+00	.57176+03	.38109+00	.45206-01	-.1844+00
	.48031+00	.39341-02	.28440+00	.22922+00	.97158-04	.20383-02	.32824-07	.16940+02	
6	.85019+03	.51024+02	.52875+01	.88469+01	-.11007+01	.65715+03	.47956+00	.48154-01	-.3468+00
	.57332+00	.22968-02	.19380+00	.22811+00	.45770-04	.24221-02	.36853-07	.16043+02	
7	.84944+03	.48791+02	.11336+02	.11521+02	-.64422+00	.50486+03	.73651+00	.46664-01	-.4297-01
	.39304+00	.77337-02	.44104+00	.22640+00	.26701-03	.15206-02	.21950-07	.18757+02	
8	.71645+03	.50547+02	.68860+01	.13206+02	-.69584+00	.57471+03	.80053+00	.60148-01	-.1792+00
	.38325+00	.64380-02	.37546+00	.22853+00	.19614-03	.21108-02	.23202-07	.18011+02	
9	.59357+03	.48097+02	.75411+01	.14514+02	-.19351+00	.60786+03	.86528+00	.64322-01	-.2351+00
	.41976+00	.44140-02	.34514+00	.22852+00	.11537-03	.20530-02	.22583-07	.17596+02	
10	.49452+03	.46417+02	.65550+01	.16101+02	.20608-01	.61700+03	.97464+00	.69597-01	-.2456+00
	.40850+00	.40712-02	.35691+00	.22865+00	.10379-03	.17681-02	.23423-07	.17720+02	
11	.41431+03	.45040+02	.57826+01	.17535+02	.50925+00	.61206+03	.10951+01	.76668-01	-.2299+00
	.37469+00	.43090-02	.39066+00	.22872+00	.11588-03	.15141-02	.22648-07	.18107+02	
12	.32094+03	.41986+02	.49167+01	.19033+02	.10202+01	.60689+03	.19351+01	.87298-01	-.2091+00
	.33933+00	.45576-02	.42595+00	.22878+00	.12852-03	.12485-02	.21838-07	.18530+02	

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DMSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10690+04	.49997+02	.12674+02	.00000	-.88869+00	.53832+03	.51203-01	.36540-01	-.1201+00
	.44789+00	.36586-02	.29435+00	.23087+00	.94351-04	.29870-02	.16042-07	.17065+02	
3	.10486+04	.50522+02	.12218+02	.26265+01	-.10396+01	.55166+03	.16130+00	.37094-01	-.1468+00
	.48130+00	.37094-02	.26498+00	.22758+00	.88514-04	.23417-02	.25606-07	.16947+02	

4	.10163E+04	.51160E+02	.11557E+02	.45515E+01	-.10436E+01	.57109E+03	.24300E+00	.37424E-01	-.1655E+00
	.49559E+00	.36476E-02	.26317E+00	.23480E+00	.89474E-04	.26946E-02	.25643E-07	.16747E+02	
5	.96026E+03	.49385E+02	.11773E+02	.64301E+01	-.76849E+00	.56521E+03	.37440E+00	.39555E-01	-.1445E+00
	.46576E+00	.37603E-02	.29743E+00	.23111E+00	.91436E-04	.19122E-02	.26911E-07	.17078E+02	
6	.87387E+03	.51020E+02	.98756E+01	.84460E+01	-.88236E+00	.60465E+03	.47602E+00	.42135E-01	-.2469E+00
	.51425E+00	.31792E-02	.25117E+00	.22920E+00	.71499E-04	.21208E-02	.31917E-07	.16600E+02	
7	.84286E+03	.46965E+02	.11392E+02	.10055E+02	-.48020E+00	.51306E+03	.66734E+00	.40831E-01	-.5604E-01
	.38042E+00	.55929E-02	.40585E+00	.22684E+00	.15465E-03	.13440E-02	.25011E-07	.18291E+02	
8	.71012E+03	.48552E+02	.89473E+01	.13148E+02	-.51651E+00	.58990E+03	.78374E+00	.52630E-01	-.2039E+00
	.41857E+00	.45959E-02	.34726E+00	.22755E+00	.12148E-03	.19003E-02	.25109E-07	.17616E+02	
9	.58062E+03	.48025E+02	.77697E+01	.14279E+02	-.12771E+00	.58375E+03	.86933E+00	.56282E-01	-.1842E+00
	.40306E+00	.39929E-02	.30654E+00	.22851E+00	.10078E-03	.18272E-02	.21356E-07	.17783E+02	
10	.46428E+03	.44539E+02	.68406E+01	.15566E+02	.52393E-01	.57636E+03	.97495E+00	.60897E-01	-.1642E+00
	.37330E+00	.40520E-02	.29190E+00	.22903E+00	.10457E-03	.16211E-02	.19943E-07	.18122E+02	
11	.40715E+03	.43240E+02	.60386E+01	.16045E+02	.52034E+00	.57182E+03	.10863E+01	.67084E-01	-.1499E+00
	.34354E+00	.40651E-02	.42153E+00	.22934E+00	.10865E-03	.14150E-02	.16970E-07	.18475E+02	
12	.32425E+03	.41294E+02	.51396E+01	.18183E+02	.10097E+01	.56707E+03	.12148E+01	.76385E-01	-.1336E+00
	.31242E+00	.40767E-02	.45252E+00	.22967E+00	.11292E-03	.11995E-02	.17963E-07	.18860E+02	

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10700E+04	.47078E+02	.13314E+02	.00000	-.66720E+00	.53819E+03	.38440E-01	.31320E-01	-.1128E+00
	.48927E+00	.26913E-02	.27662E+00	.22772E+00	.56756E-04	.16527E-02	.26763E-07	.16863E+02	
3	.10704E+04	.47959E+02	.13326E+02	.24291E+01	-.73302E+00	.52414E+03	.14855E+00	.31795E-01	-.8736E-01
	.45366E+00	.35195E-02	.30947E+00	.23187E+00	.82816E-04	.13839E-02	.32113E-07	.17196E+02	
4	.10465E+04	.49265E+02	.12642E+02	.43125E+01	-.91747E+00	.52436E+03	.25971E+00	.32078E-01	-.8985E-01
	.43706E+00	.40177E-02	.32936E+00	.22770E+00	.97314E-04	.17238E-02	.26591E-07	.17411E+02	
5	.96211E+03	.46752E+02	.12645E+02	.59276E+01	-.61123E+00	.51298E+03	.35784E+00	.33905E-01	-.6033E-01
	.41674E+00	.38801E-02	.34740E+00	.23039E+00	.95417E-04	.15004E-02	.24991E-07	.17612E+02	
6	.86515E+03	.47296E+02	.11219E+02	.78758E+01	-.74537E+00	.52510E+03	.47573E+00	.36116E-01	-.8331E-01
	.41098E+00	.42163E-02	.35153E+00	.23168E+00	.10797E-03	.14907E-02	.26429E-07	.17665E+02	
7	.83737E+03	.44886E+02	.11882E+02	.93871E+01	-.43826E+00	.48718E+03	.59662E+00	.34998E-01	-.3161E-02
	.35212E+00	.45958E-02	.41699E+00	.23121E+00	.12481E-03	.96123E-03	.26539E-07	.18350E+02	
8	.70079E+03	.46238E+02	.95341E+01	.12586E+02	-.47524E+00	.54188E+03	.79256E+00	.45111E-01	-.1070E+00
	.37373E+00	.40977E-02	.39125E+00	.22864E+00	.12696E-03	.15534E-02	.22654E-07	.18119E+02	
9	.57227E+03	.43691E+02	.83249E+01	.13568E+02	-.88630E-01	.53263E+03	.88381E+00	.48242E-01	-.8180E-01
	.35652E+00	.40205E-02	.40775E+00	.23043E+00	.10450E-03	.13718E-02	.19467E-07	.18311E+02	
10	.47488E+03	.41702E+02	.73206E+01	.14633E+02	.11748E+00	.52930E+03	.95165E+00	.52198E-01	-.6876E-01
	.33730E+00	.36424E-02	.42677E+00	.23100E+00	.94109E-04	.11980E-02	.17696E-07	.18536E+02	
11	.39365E+03	.40482E+02	.63076E+01	.15771E+02	.43904E+00	.52684E+03	.10510E+01	.57501E-01	-.5999E-01
	.31755E+00	.35748E-02	.44692E+00	.23104E+00	.92717E-04	.10492E-02	.17387E-07	.18784E+02	
12	.30369E+03	.38426E+02	.52285E+01	.17027E+02	.79376E+00	.52413E+03	.11702E+01	.65473E-01	-.4734E-01
	.29529E+00	.35002E-02	.46515E+00	.23106E+00	.91182E-04	.88513E-03	.16695E-07	.19066E+02	

AT LINE 12

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.11692E+04	.45715E+02	.13474E+02	.00000	-.43276E+00	.54698E+03	.24729E-01	.26100E-01	-.1267E+00
	.51499E+00	.20436E-02	.25275E+00	.22891E+00	.39162E-04	.12727E-02	.26443E-07	.16595E+02	
3	.11565E+04	.46680E+02	.13000E+02	.21493E+01	-.51318E+00	.55459E+03	.12567E+00	.26496E-01	-.1436E+00
	.51422E+00	.22571E-02	.24644E+00	.23538E+00	.46145E-04	.11532E-02	.36584E-07	.16546E+02	
4	.10338E+04	.47545E+02	.12963E+02	.41526E+01	-.68599E+00	.53130E+03	.24607E+00	.26732E-01	-.9920E-01
	.46215E+00	.32216E-02	.30943E+00	.22374E+00	.71232E-04	.13904E-02	.29744E-07	.17172E+02	
5	.97222E+03	.45704E+02	.12628E+02	.56609E+01	-.46550E+00	.53362E+03	.33487E+00	.28254E-01	-.9841E-01
	.44352E+00	.27745E-02	.30111E+00	.23142E+00	.60245E-04	.13264E-02	.26804E-07	.17101E+02	
6	.89750E+03	.45510E+02	.11399E+02	.75916E+01	-.47970E+00	.53004E+03	.45508E+00	.30096E-01	-.8861E-01
	.43023E+00	.32267E-02	.33072E+00	.23456E+00	.74980E-04	.11942E-02	.27110E-07	.17428E+02	

7	.8[illegible]+03	.43195+02	.11609+02	.67159+01	-.32566+00	.52421+03	.59860+00	.29165-01	-.7095-01
	.49270+00	.27024-02	.33787+00	.23587+00	.59716-04	.60476-03	.31244-07	.17496+02	
8	.68456+03	.44251+02	.57212+01	.12217+02	-.38133+00	.57882+03	.74647+00	.37593-01	-.7797-01
	.37175+00	.39242-02	.38597+00	.23302+00	.10048-03	.12316-02	.22777-07	.18103+02	
9	.56446+03	.42062+02	.83369+01	.13098+02	-.16981-01	.54242+03	.81907+00	.40201-01	-.9755-01
	.38644+00	.26445-02	.37566+00	.23402+00	.64813-04	.97117-03	.23116-07	.17900+02	
10	.46641+03	.40510+02	.71408+01	.14031+02	.14527+00	.55025+03	.88215+00	.43498-01	-.1073+00
	.39087+00	.23615-02	.37199+00	.23394+00	.50551-04	.79067-03	.23860-07	.17872+02	
11	.37936+03	.38945+02	.60[illegible]5+01	.15145+02	.39614+00	.55317+03	.96691+00	.47917-01	-.1073+00
	.38[illegible]3+00	.20[illegible]02-02	.36256+00	.23382+00	.43727-04	.66898-03	.23837-07	.17988+02	
12	.2851[illegible]+03	.35998+02	.49797+01	.16405+02	.67994+00	.55647+03	.10685+01	.54561-01	-.1040+00
	.34946+00	.17621-02	.39452+00	.23369+00	.36007-04	.53132-03	.23821-07	.18121+02	

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10689+04	.41741+02	.15899+02	.00000	-.24439+00	.45679+03	.15281-01	.20880-01	.5736-01
	.39245+00	.25950-02	.37479+00	.22942+00	.55030-04	.69955-03	.25075-07	.17892+02	
3	.10535+04	.43071+02	.14646+02	.15734+01	-.31756+00	.49825+03	.96220-01	.21197-01	-.2571-01
	.44773+00	.22999-02	.31640+00	.23280+00	.46387-04	.71731-03	.32200-07	.17250+02	
4	.10344+04	.44675+02	.13714+02	.37107+01	-.51865+00	.52334+03	.29034+00	.21385-01	-.7712-01
	.47071+00	.23779-02	.29971+00	.22613+00	.47434-04	.10228-02	.30107-07	.17063+02	
5	.97451+03	.43038+02	.13394+02	.51974+01	-.36931+00	.52339+03	.30636+00	.22603-01	-.7241-01
	.44954+00	.20341-02	.29700+00	.23046+00	.39246-04	.92931-03	.27993-07	.17042+02	
6	.85813+03	.43289+02	.11679+02	.68036+01	-.34725+00	.52046+03	.40825+00	.24077-01	-.6621-01
	.44709+00	.23587-02	.31751+00	.23210+00	.48210-04	.68999-03	.28324-07	.17265+02	
7	.82133+03	.41266+02	.11936+02	.77659+01	-.26164+00	.51810+03	.47137+00	.23332-01	-.5578-01
	.44994+00	.19246-02	.31929+00	.23312+00	.37076-04	.69001-03	.29037-07	.17279+02	
8	.67862+03	.41495+02	.99916+01	.11212+02	-.35070+00	.53560+03	.68949+00	.30074-01	-.8567-01
	.41503+00	.23149-02	.34846+00	.23334+00	.48520-04	.79968-03	.26147-07	.17604+02	
9	.55600+03	.39221+02	.86683+01	.11928+02	.10329-01	.53335+03	.74138+00	.32161-01	-.7482-01
	.41403+00	.17493-02	.35103+00	.23256+00	.33140-04	.59631-03	.25619-07	.17621+02	
10	.45506+03	.37672+02	.74399+01	.12721+02	.99533-01	.52866+03	.80339+00	.34798-01	-.6103-01
	.40281+00	.15124-02	.36315+00	.23202+00	.27493-04	.47424-03	.25341-07	.17751+02	
11	.37134+03	.36242+02	.63570+01	.13689+02	.27505+00	.52766+03	.87830+00	.38334-01	-.5428-01
	.39136+00	.13122-02	.37500+00	.23189+00	.23300-04	.39003-03	.25089-07	.17881+02	
12	.26387+03	.33967+02	.52279+01	.14777+02	.47249+00	.52653+03	.94722+00	.43649-01	-.4485-01
	.37852+00	.10669-02	.38633+00	.23175+00	.18582-04	.29530-03	.24805-07	.18031+02	

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10646+04	.40193+02	.17571+02	.00000	-.61726-01	.38342+03	.49125-02	.15660-01	.2013+00
	.29134+00	.36729-02	.47321+00	.23108+00	.97255-04	.59447-03	.17947-07	.19116+02	
3	.10548+04	.41126+02	.16281+02	.10983+01	-.23225+00	.43099+03	.72309-01	.15897-01	.1082+00
	.35631+00	.29228-02	.40636+00	.23175+00	.64718-04	.59765-03	.23845-07	.18294+02	
4	.10225+04	.43327+02	.14044+02	.35029+01	-.29501+00	.51139+03	.20900+00	.16039-01	-.5089-01
	.44078+00	.21903-02	.30712+00	.22893+00	.42504-04	.93474-03	.26460-07	.17146+02	
5	.96897+03	.40949+02	.14514+02	.49870+01	-.18119+00	.47874+03	.30882+00	.16952-01	.1871-01
	.41003+00	.21847-02	.35553+00	.23148+00	.43148-04	.72285-03	.24179-07	.17676+02	
6	.85431+03	.40959+02	.12622+02	.63057+01	-.18226+00	.48280+03	.39181+00	.18058-01	.1165-01
	.40475+00	.22637-02	.36031+00	.23169+00	.45300-04	.74280-03	.23072-07	.17732+02	
7	.80915+03	.39338+02	.12626+02	.73868+01	-.21684-01	.48572+03	.44102+00	.17499-01	.1096-01
	.40798+00	.18381-02	.35689+00	.23261+00	.34163-04	.64733-03	.23320-07	.17690+02	
8	.66624+03	.40638+02	.10160+02	.10587+02	-.14140+00	.53799+03	.64451+00	.22556-01	-.8928-01
	.44026+00	.15467-02	.32534+00	.23221+00	.27154-04	.62390-03	.25842-07	.17338+02	
9	.54328+03	.37559+02	.89846+01	.11230+02	.23852-01	.50126+03	.71691+00	.24121-01	-.1049-01
	.38956+00	.15765-02	.37610+00	.23223+00	.28379-04	.50065-03	.22044-07	.17901+02	

	•3474[illegible]+00	•15934-02	•41787+00	•23250+00	•28516-04	•40395-03	•19654-07	•18394+02	
11	•3[illegible]+03	•34512+02	•[illegible]+01	•12764+02	•23169+00	•96733+03	•87014+00	•28750-01	•6321-01
	•32696+00	•13587-02	•43652+00	•23281+00	•24518-04	•32776-03	•16877-07	•18619+02	
12	•27658+03	•32582+02	•55985+01	•13764+02	•40358+00	•45935+03	•96378+00	•32737-01	•8417-01
	•3[illegible]+00	•10963-02	•45735+00	•23316+00	•20055-04	•24256-03	•16010-07	•18677+02	

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	•10694+04	•33621+02	•24417+02	•00000	•41261-02	•23113+03	•34285-03	•10440-01	•5054+00
	•92555-01	•62667-02	•67012+00	•23033+00	•46250-03	•20328-03	•61530-08	•22140+02	
3	•10713+04	•34563+02	•23091+02	•59736+00	-•23929+00	•25877+03	•53478-01	•10598-01	•4510+00
	•13014+00	•47408-02	•63336+00	•23131+00	•17788-03	•21134+03	•90726-08	•21484+02	
4	•10383+04	•36837+02	•19731+02	•27201+01	-•18462+00	•32416+03	•20352+00	•10693-01	•3222+00
	•21429+00	•36794-02	•55052+00	•23105+00	•15296-03	•40118-03	•12320-07	•20182+02	
5	•97863+03	•35186+02	•20274+02	•38912+01	-•10074+00	•28652+03	•37144+00	•11302-01	•3977+00
	•15852+00	•43009-02	•60492+00	•23177+00	•18539-03	•30000-03	•94544-08	•21021+02	
6	•86293+03	•35166+02	•17623+02	•47737+01	-•14995+00	•29321+03	•38019+00	•12039-01	•3854+00
	•16226+00	•41434-02	•60000+00	•23247+00	•18642-03	•30974-03	•92931-08	•20944+02	
7	•81639+03	•33821+02	•17564+02	•56203+01	-•63316-01	•29105+03	•46271+00	•11666-01	•3928+00
	•14067+00	•35677-02	•60321+00	•23211+00	•19333-03	•25238-03	•99473-08	•20982+02	
8	•66626+03	•34472+02	•13519+02	•82915+01	-•10926+00	•34585+03	•69787+00	•15037-01	•2892+00
	•21300+00	•25478-02	•55044+00	•23306+00	•68684-04	•27873-03	•12623-07	•20168+02	
9	•53946+03	•32348+02	•12066+02	•88423+01	-•61043-01	•31307+03	•71386+00	•16081-01	•3564+00
	•14668+00	•23672-02	•59694+00	•23373+00	•50634-04	•20481-03	•95948-08	•20868+02	
10	•43782+03	•30698+02	•10576+02	•93190+01	•42640-02	•29087+03	•79164+00	•17399-01	•4023+00
	•13403+00	•23760-02	•62936+00	•23399+00	•91925-04	•15428-03	•79256-08	•21386+02	
11	•35279+03	•29442+02	•69828+01	•99765+01	•11222+00	•28374+03	•87163+00	•19167-01	•4189+00
	•11976+00	•21391-02	•64385+00	•23402+00	•91988-04	•12290-03	•74582-08	•21621+02	
12	•28918+03	•27634+02	•73416+01	•10728+02	•23566+00	•27559+03	•97120+00	•21824-01	•4383+00
	•10349+00	•18683-02	•66042+00	•23404+00	•92059-04	•67023-04	•69237-08	•21896+02	

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	•10539+04	•27935+02	•31593+02	•00000	•10981+00	•15162+03	•11917-01	•52200-02	•6672+00
	•76819-02	•26503-01	•74639+00	•20666+00	•12749-01	•23654-04	•20507-08	•24159+02	
3	•10031+04	•28896+02	•30425+02	•41651+00	-•64641-01	•14172+03	•44512-01	•52992-02	•6462+00
	•14954-01	•19965-01	•74205+00	•21511+00	•79068-02	•33351-04	•26603-08	•23857+02	
4	•10333+04	•31414+02	•26378+02	•21738+01	•32665-01	•19276+03	•21054+00	•53463-02	•5828+00
	•42316-01	•11141-01	•71684+00	•22561+00	•18190-02	•77170-04	•53171-08	•23130+02	
5	•96684+03	•29550+02	•27136+02	•30651+01	•55441-01	•16904+03	•32170+00	•56508-02	•6317+00
	•16679-01	•22644-01	•73694+00	•21194+00	•97458-02	•54547-04	•26589-08	•23879+02	
6	•85074+03	•29549+02	•23765+02	•36755+01	•30314-01	•17221+03	•38185+00	•60193-02	•6258+00
	•17453-01	•20622-01	•73882+00	•21479+00	•82591-02	•54062-04	•27449-08	•23813+02	
7	•79381+03	•28897+02	•22623+02	•44475+01	•15146+00	•17445+03	•46357+00	•58330-02	•6231+00
	•19393-01	•19114-01	•73789+00	•21565+00	•79156-02	•42783-04	•36346-08	•23757+02	
8	•64604+03	•29973+02	•17311+02	•66335+01	•73641-01	•20593+03	•65365+00	•75185-02	•5624+00
	•39984-01	•10325-01	•72092+00	•22641+00	•23026-02	•62588-04	•48594-08	•23167+02	
9	•53619+03	•28402+02	•15527+02	•70653+01	-•92446-02	•16831+03	•74114+00	•80403-02	•5991+00
	•19293-01	•17425-01	•73635+00	•21759+00	•72998-02	•39366-04	•34833-08	•23726+02	
10	•43164+03	•26846+02	•13490+02	•74163+01	•21569-01	•17509+03	•61604+00	•86996-02	•6275+00
	•94293-02	•25896-01	•74444+00	•20210+00	•18110-01	•26034-04	•27937-08	•24206+02	
11	•34617+03	•25847+02	•11336+02	•79059+01	•78850-01	•17148+03	•89220+00	•95835-02	•6366+00
	•69757-02	•29511-01	•74540+00	•19343+00	•24863-01	•21895-04	•23889-08	•24419+02	
12	•28317+03	•24585+02	•91543+01	•84775+01	•14600+00	•16726+03	•98874+00	•10912-01	•6474+00
	•40956-02	•35515-01	•74653+00	•18326+00	•32779-01	•17042-04	•19144-08	•24672+02	

AT LINE 17

	P	T	RHO	V	V	E	M	Z	CF	CH
	N	N0	N2	O	O2	NO+	E-			
2	.10749+04	.10511+02	.10226+03	.00000	.00000	.25000+02	.00000	.11668-08	.0000	-.8928-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
3	.10726+04	.10511+02	.10205+03	.00000	.00000	.25000+02	.00000	.11845-08	-.2098-02	-.9342-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
4	.10469+04	.10511+02	.99599+02	.00000	.00000	.25000+02	.00000	.11950-08	-.1153-01	-.1072-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
5	.96504+03	.10511+02	.93713+02	.00000	.00000	.25000+02	.00000	.12630-08	-.1543-01	-.9113-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
6	.86021+03	.10511+02	.81837+02	.00000	.00000	.25000+02	.00000	.13454-08	-.1702-01	-.8558-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
7	.82620+03	.10511+02	.78602+02	.00000	.00000	.25000+02	.00000	.13038-08	-.2153-01	-.8615-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
8	.65535+03	.10511+02	.62347+02	.00000	.00000	.25000+02	.00000	.16805-08	-.2501-01	-.7170-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
9	.52607+03	.10511+02	.50048+02	.00000	.00000	.25000+02	.00000	.17971-08	-.2499-01	-.6187-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
10	.42419+03	.10511+02	.40356+02	.00000	.00000	.25000+02	.00000	.19445-08	-.2410-01	-.5193-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
11	.33996+03	.10511+02	.32344+02	.00000	.00000	.25000+02	.00000	.21421-08	-.2326-01	-.4427-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
12	.25891+03	.10511+02	.24638+02	.00000	.00000	.25000+02	.00000	.24391-08	-.2186-01	-.3573-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		

II. Non-reacting thick-shock code

STORAGE USED: CODE(1) 000417; DATA(3) 000155; BLANK COMMON(2) 00000

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000041
0005	MAIN3	000010
0006	MAIN4	000024
0007	MAIN5	000524
0010	REGIN1	016040
0011	BODY1	000240
0012	DIFF1	045400
0013	SHOCK1	000170
0014	THERM1	016040

EXTERNAL REFERENCES (BLOCK, NAME)

0015	ACHEM
0016	VISFLO
0017	NWDU$
0020	NI02$
0021	NRDU$
0022	NI01$
0023	NSTOP$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000		000004	100F	0000		000005	101F	0000		000007	102F	0000		000023	103F	0000	000032	104F
0000		000033	105F	0000		000035	106F	0000		000054	107F	0000		000064	108F	0000	000071	109F
0000		000101	110F	0000		000123	120F	0001		000013	136G	0001		000025	144G	0001	000063	170G
0001		000301	302G	0001		000353	325G	0001		000377	335G	0001		000000	5L	0014	004540	A
0004	R	000000	ACH	0005	R	000005	AIN	0004	R	000037	ANGLE	0011		000170	CURV	0004	R 000013	DNU
0004	R	000016	DNU2	0004	R	000014	DT	0004	R	000012	DXI	0004	R	000017	DXINU	0004	R 000015	DXI2
0005	R	000003	EIN	0004	R	000034	ELL	0004	R	000025	EPS	0004		000030	ERR	0004	R 000006	GA
0004	R	000002	GAMMA	0004	R	000007	GB	0004	R	000010	GC	0004	R	000011	GD	0004	R 000040	GE
0010		000000	HH1	0010		004540	HH2	0010		011300	HH3	0005	R	000004	HIN	0004	000033	HST
0003	I	000012	I	0003	I	000013	J	0003	I	000006	JA	0003		000021	JC	0003	I 000014	K
0003	I	000007	KA	0003	I	000017	LB	0003	I	000020	LE	0003	I	000010	M	0003	I 000000	MA
0003	I	000004	MC	0003	I	000002	MCM	0000	I	000001	MONTH	0000	I	000003	MYEAR	0003	I 000015	M1
0003	I	000011	N	0003	I	000001	NA	0003	I	000005	NC	0003	I	000003	NCM	0000	I 000002	NDAY
0000	I	000000	NRUN	0007	R	000050	NU	0003	I	000016	N1	0014		000000	P	0011	000120	PHI
0005	R	000000	PIN	0004	R	000004	PR	0004		000021	RANGE	0004	R	000003	RE	0005	R 000001	RIN
0007		000144	S	0004	R	000022	SMIN	0007		000214	SN	0007		000264	ST	0004	R 000005	STAB
0007		000334	STN	0007		000404	SXI	0007		000454	SXIN	0014		011300	T	0004	R 000020	TIME
0005	R	000002	TIN	0004	R	000036	TW	0012		000000	U	0005		000006	UIN	0012	022600	UN
0004	R	000001	UO	0005		000007	VIN	0007	R	000000	XI	0004	R	000035	XIMAX	0011	000000	YB
0013		000000	YS	0004	R	000024	YO	0006	R	000000	ZA	0011		000050	ZB	0013	000050	ZS
0013		000120	ZSY	0004	R	000023	ZO											


```
00100      1*      C
00100      2*      C                2D VISCOUS SHOCK LAYER CALCULATION USING CONSERVATIVE
```

```
0.134      63*          READ (5,104)(ZA(I),I=1,12)
00142      64*          WRITE(6,105)(ZA(I),I=1,12)
00150      65*          READ(5,100) NRUN,MONTH,NDAY,MYEAR,LB,LE
00160      66*          READ (5,100) MA,NA,KA,JA
00166      67*          READ (5,101)(EPS(M),M=1,3)
00174      68*          READ (5,101) RE,PR,TW
00201      69*          READ (5,101) U0,PIN,HIN,GAMMA
00207      70*          READ (5,101) STAB,ELL,Z0,Y0,XIMAX,ANGLE
00217      71*       11 WRITE(6,102)NRUN,MONTH,NDAY,MYEAR,LB,LE
00227      72*          WRITE(6,107)MA,NA,KA,JA
00235      73*          WRITE(6,103)GAMMA,STAB
00241      74*          WRITE(6,109)RE,PR,TW
00246      75*          WRITE(6,120)Z0,Y0,XIMAX,ANGLE
00254      76*          GA=GAMMA/(GAMMA-1.)
00255      77*          GB=1./(GAMMA-1.)
00256      78*          GC=(GAMMA+1.)/(GAMMA-1.)
00257      79*          GD=(GAMMA-1.)/2.
00260      80*          GE=(GAMMA+1.)/2.
00261      81*          CALL ACHEM(8,PIN,HIN,RIN)
00262      82*          CALL ACHEM(9,PIN,HIN,TIN)
00263      83*          CALL ACHEM(10,PIN,HIN,AIN)
00264      84*          CALL ACHEM(11,PIN,HIN,EIN)
00265      85*          ACH=U0/AIN
00266      86*          ANGLE=ANGLE*0.01745329252
00266      87*     C
00267      88*          WRITE(6,110)U0,PIN,HIN,RIN,TIN,EIN,ACH
00300      89*          WRITE(6,108)(EPS(M),M=1,3)
00300      90*     C
00306      91*          TIME=0.
00307      92*          K=0
00310      93*          J=0
00311      94*          M1=0
00312      95*          N1=0
00313      96*          DT=0.
00313      97*     C
00314      98*          SMIN=ACH**2.
00315      99*          DXI=XIMAX/FLOAT(MA)
00316     100*          DNU=1./FLOAT(NA)
00317     101*          DXI2=DXI*DXI
00320     102*          DNU2=DNU*DNU
00321     103*          DXINU=DXI*DNU*4.
00322     104*          MC=MA+2
00323     105*          NC=NA+2
00323     106*     C
00324     107*          DO 1 M=2,MC
00327     108*        1 XI(M)=DXI*FLOAT(M-2)
00331     109*          XI(1)=-XI(3)
00331     110*     C
00332     111*          MCM=MC-1
00333     112*          NCM=NC-1
00333     113*     C
00334     114*          DO 2 N=2,NC
00337     115*        2 NU(N)=DNU*FLOAT(N-2)
00337     116*     C
00337     117*     C
00341     118*          CALL VISFLO
```

```
0.343      120*            GO TO 5
0.344      121*            END
0.344      122*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```



```
* FOR VISFLO,VISFLO
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  *(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:25
```

25 JUN 72 5:17:25.443

```
SUBROUTINE VISFLO    ENTRY POINT 000405

STORAGE USED: CODE(1) 000422; DATA(0) 000111; BLANK COMMON(2) 000007

 COMMON BLOCKS:

 0003   MAIN1  000022
 0004   MAIN2  000041
 0005   MAIN3  000010
 0006   MAIN5  000524
 0007   DIFF1  045400
 0010   THERM1 016040


EXTERNAL REFERENCES (BLOCK, NAME)

 0011   BODY
 0012   CONVR1
 0013   OUTPUT
 0014   DIFF
 0015   SQRT
 0016   NEXP6$
 0017   NWDU$
 0020   NIO2$
 0021   NERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

 0001   000107 130G      0001   000112 133G      0001   000360 15L       0000   000015 150F      0001   000253 161G
 0001   000361 17L       0001   000303 172G      0001   000235 34L       0001   000006 8L        0010 R 004540 A
 0004 R 000000 ACH       0005   000005 AIN       0004   000037 ANGLE     0000 R 000002 DAM       0000 R 000003 DEM
 0000 R 000014 DEM1      0000 R 000000 DIM       0004   000013 DNU       0004   000016 DNU2      0000 R 000011 DOM
 0000 R 000013 DOM1      0000 R 000004 DS        0004 R 000014 DT        0000 R 000005 DT1       0000 R 000007 DT2
 0000 R 000012 DUM       0004 R 000012 DXI       0004   000017 DXINU     0004   000015 DXI2      0005   000003 EIN
 0004   000034 ELL       0004   000025 EPS       0004   000030 ERR       0004   000006 GA        0004 R 000002 GAMMA
 0004   000007 GB        0004   000010 GC        0004   000011 GD        0004   000040 GE        0005   000004 HIN
 0004   000033 HST       0003   000012 I         0000   000053 INJP$     0003   000013 J         0003 I 000006 JA
 0003   000021 JC        0003 I 000014 K         0003 I 000007 KA        0000 I 000010 KM        0000 I 000001 L
 0003   000017 LB        0003   000020 LE        0003 I 000010 M         0003   000000 MA        0003 I 000004 MC
 0003 I 000002 MCM       0003 I 000015 MI        0003 I 000011 N         0003   000001 NA        0003 I 000005 NC
 0003 I 000003 NCM       0006 R 000050 NU        0003 I 000016 N1        0010 R 000000 P         0005   000000 PIN
 0004   000004 PR        0004 R 000021 RANGE     0004 R 000003 RE        0000 R 000006 REVARI     0005   000001 RIN
 0006 R 000144 S         0004   000022 SMIN      0006   000214 SN        0006 R 000264 ST        0004 R 000005 STAB
 0006   000334 STN       0006   000404 SXI       0006   000454 SXIN      0010 R 011300 T         0004 R 000020 TIME
 0005   000002 TIN       0004   000036 TW        0007 R 000000 U         0005   000006 UIN       0007   022600 UN
 0004   000001 U0        0005   000007 VIN       0006   000000 X1        0004   000035 XIMAX     0004   000024 Y0
 0004   000023 Z0

00101      1*            SUBROUTINE VISFLO
00101      2*      C
00103      3*            PARAMETER MM=40,NN=60,JJ=4
00104      4*            REAL NU
```

```
00106      6*          COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106      7*         1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00106      8*         2             ,XIMAX,TW,ANGLE,GE
00107      9*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00110     10*          COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00110     11*         1       SXIN(MM)
00111     12*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00112     13*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00112     14*     C
00113     15*       150 FORMAT(1H0,4HSTEP,I4,7H, TIME=  E11.4,20H, STANDOFF DISTANCE=  E11
00113     16*         1       ,4/9X,5HWMAX=  E11.4,7H, WMIN=  E11.4,9H, WRANGE=  E11.4,14
00113     17*         2       H, MAXIM PRESS=  E11.4)
00113     18*     C
00113     19*     C
00113     20*     C     ********************************************************************
00114     21*           CALL BODY
00115     22*           CALL CONVR1
00116     23*           CALL OUTPUT
00116     24*     C     ********************************************************************
00116     25*     C
00116     26*     C
00116     27*     C     START TIME-DEPENDENT CALCULATION
00117     28*           8 K=K+1
00120     29*           L=L+1
00120     30*     C
00120     31*     C     DETERMINE STEP SIZE
00120     32*     C
00121     33*           N1=0
00122     34*           M1=0
00123     35*           DAM=S(2)*(NU(NC)-NU(NCM))
00124     36*           DEM=DXI
00125     37*           DS=AMIN1(DAM,DEM)
00126     38*           DT=STAB*DS/1.5/(SQRT((J(NC,2,2)/U(NC,2,1))**2.+(U(NC,2,3)/U(NC,2,1
00126     39*         1       ))**2.)+A(NC,2))
00127     40*           DO 34 M=2,MCM
00132     41*           DO 34 N=2,NCM
00135     42*           DAM=S(M)*(NU(N+1)-NU(N))
00136     43*           DS=AMIN1(DAM,DEM)
00137     44*           DT1=STAB*DS/1.5/(SQRT((J(N,M,2)/U(N,M,1))**2.+(U(N,M,3)/U(N,M,1))
00137     45*         1       **2.)+A(N,M))
00140     46*           DT1=STAB/(ABS(U(N,M,2)/J(N,M,1))/DEM+ABS(U(N,M,3)/U(N,M,1))/DAM
00140     47*         1       +A(N,M)*SQRT(1./DEM**2.+1./DAM**2.))
00141     48*           REVAR1=RE*(T(N,M)*0.5)/1.5/T(N,M)**1.5
00142     49*           DT2=DS**2./8./(SQRT(GAMMA)*ACH/REVAR1)
00143     50*           DT1=AMIN1(DT1,DT2)
00144     51*           IF(DT1-DT)35,34,34
00147     52*        35 DT=DT1
00150     53*           N1=N
00151     54*           M1=M
00152     55*        34 CONTINUE
00152     56*     C
00152     57*     C     INTERMEDIATE OUTPUT
00152     58*     C
00155     59*        20 KM=K-1
00156     60*           DAM=ST(2)
00157     61*           DOM=DAM
```

```
00164      64*          22 DOM=AMIN1(ST(M),DOM)
00166      65*             RANGE=ABS(DAM-DOM)
00167      66*             DIM=S(2)
00170      67*             DUM=P(NC,2)
00171      68*             DO 221 M=3,MC
00174      69*             DOM1=P(NC,M)
00175      70*             DEM1=S(M)
00176      71*             DIM=AMIN1(DIM,DEM1)
00177      72*         221 DUM=AMAX1(DUM,DOM1)
00201      73*             TIME=TIME+DT
00202      74*             WRITE(6,150)KM,TIME,DIM,DAM,DOM,RANGE,DUM
00202      75*       C
00202      76*       C
00202      77*       C     ***************************************************************
00213      78*             CALL DIFF
00213      79*       C     ***************************************************************
00213      80*       C
00213      81*       C
00214      82*             IF(K.GE.KA) GO TO 17
00216      83*             IF(L.LT.JA) GO TO 15
00216      84*       C     ***************************************************************
00220      85*          16 CALL OUTPUT
00220      86*       C     ***************************************************************
00221      87*             L=0
00222      88*          15 GO TO 8
00222      89*       C
00223      90*          17 CALL OUTPUT
00224      91*             RETURN
00225  *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00225      92*             END

337

        END OF COMPILATION:          1 DIAGNOSTICS.
```

```
SUBROUTINE NEWMES    ENTRY POINT 000337

STORAGE USED: CODE(1) 000355; DATA(0) 000047; BLANK COMMON(2) 000001

 COMMON BLOCKS:

 0003   MAIN1  000022
 0004   MAIN2  000041
 0005   MAIN5  000524
 0006   DIFF1  045400
 0007   THERM1 016040

 EXTERNAL REFERENCES (BLOCK, NAME)

 0011   REGION
 0012   CONVR2
 0013   THERM
 0014   NERR3$

 STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

 0001   000021 114G      0001   000034 123G      0001   000035 126G      0001   000141 147G      0001   000162 157G
 0001   000163 162G      0001   000201 171G      0001   000227 202G      0001   000243 205G      0007 R 004540 A
 0004   000000 ACH       0004   000037 ANGLE     0004 R 000013 DNU       0004   000016 DNU2      0004   000014 DT
 0004 R 000012 DXI       0004   000017 DXINU     0004   000015 DXI2      0004   000034 ELL       0004   000025 EPS
 0004   000030 ERR       0004   000006 GA        0004   000002 GAMMA     0004   000007 GB        0004   000010 GC
 0004   000011 GD        0004   000040 GE        0004   000033 HST       0010   000000 H1        0010   000013 H1NU
 0010   000015 H1XI      0010   000003 H12       0010   000006 H123      0010   000001 H2        0010   000016 H2NU
 0010   000014 H2XI      0010   000004 H23       0010   000002 H3        0010   000020 H3NU      0010   000017 H3XI
 0010   000021 H3XINU    0010   000022 H3XIXI    0010   000005 H31       0003   000012 I         0000   000015 INJP$
 0003 I 000013 J         0003   000006 JA        0003   000021 JC        0003   000014 K         0003   000007 KA
 0003   000017 LB        0003   000020 LE        0003 I 000010 M         0003   000000 MA        0003 I 000004 MC
 0003 I 000002 MCM       0003   000015 M1        0003 I 000011 N         0003   000001 NA        0003 I 000005 NC
 0003 I 000003 NCM       0005 R 000050 NU        0003   000016 N1        0007 R 000000 P         0004   000004 PR
 0004   000021 RANGE     0004   000003 RE        0005 R 000144 S         0004   000022 SMIN      0005 R 000214 SN
 0005   000264 ST        0004   000005 STAB      0005   000334 STN       0005 R 000404 SXI       0005 R 000454 SXIN
 0007 R 011300 T         0004   000020 TIME      0004   000036 TW        0006 R 000000 U         0006 R 022600 UN
 0004   000001 U0        0010 R 000007 U1        0010 R 000010 U2        0010 R 000011 U3        0010 R 000012 U4
 0005 R 000000 XI        0004 R 000035 XIMAX     0004   000024 Y0        0004   000023 Z0

00101      1*            SUBROUTINE NEWMES
00103      2*            PARAMETER MM=40,NN=60,JJ=4
00104      3*            REAL NU
00105      4*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00106      5*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106      6*           1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
```

```
00106      7*          2             ,XIMAX,TW,ANGLE,GE
00107      8*           COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00107      9*          1          SXIN(MM)
00110     10*           COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00111     11*           COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00112     12*           COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00112     13*          1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00112     14*     C     REDUCE THE MESH SIZE TO ITS HALF
00112     15*     C
00113     16*           DO 2 M=1,MCM
00116     17*           SN(2*M)=S(M+1)
00117     18*           SN(2*M+1)=0.5*(S(M+1)+S(M+2))
00120     19*           SXIN(2*M)=SXI(M+1)
00121     20*           SXIN(2*M+1)=0.5*(SXI(M+1)+SXI(M+2))
00122     21*           DO 2 N=1,NCM
00125     22*           DO 2 J=1,JJ
00130     23*           UN(2*N,2*M,J)=U(N+1,M+1,J)
00131     24*           UN(2*N+1,2*M,J)=0.5*(U(N+1,M+1,J)+U(N+2,M+1,J))
00132     25*           UN(2*N+1,2*M+1,J)=0.25*(U(N+1,M+1,J)+U(N+2,M+1,J)+U(N+1,M+2,J)
00132     26*          1        +U(N+2,M+1,J))
00133     27*           UN(2*N,2*M+1,J)=0.5*(U(N+1,M+1,J)+U(N+1,M+2,J))
00134     28*         2 CONTINUE
00140     29*           MC=2*MCM
00141     30*           NC=2*NCM
00142     31*           MCM=MC-1
00143     32*           NCM=NC-1
00144     33*           DXI=XIMAX/FLOAT(MC-2)
00145     34*           DNU=1./FLOAT(NC-2)
00145     35*     C
00146     36*           DO 3 N=2,NC
00151     37*           NU(N)=DNU*FLOAT(N-2)
00152     38*           UN(N,1,1)=UN(N,3,1)
00153     39*           UN(N,1,2)=-UN(N,3,2)
00154     40*           UN(N,1,3)=UN(N,3,3)
00155     41*           UN(N,1,4)=UN(N,3,4)
00156     42*           DO 3 M=1,MC
00161     43*           DO 3 J=1,JJ
00164     44*         3 U(N,M,J)=UN(N,M,J)
00170     45*           DO 4 M=1,MC
00173     46*           XI(M)=DXI*FLOAT(M-2)
00174     47*           S(M)=SN(M)
00175     48*         4 SXI(M)=SXIN(M)
00177     49*           XI(1)=XI(3)
00200     50*           CALL REGION
00201     51*           DO 5 M=1,MC
00204     52*           DO 5 N=2,NC
00207     53*           CALL CONVR2(N,M)
00210     54*           U4=U4=0.5*(U2**2,+U3**2,)
00211     55*           CALL THERM(1,U1,U4,P(N,M))
00212     56*           CALL THERM(2,U1,U4,T(N,M))
00213     57*           CALL THERM(3,U1,U4,A(N,M))
00214     58*         5 CONTINUE
00214     59*     C
00217     60*           RETURN
00220     61*           END
00220     62*     C
```

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END OF COMPILATION:        NO  DIAGNOSTICS.
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UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A *(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05117128

SUBROUTINE BODY ENTRY POINT 000375

STORAGE USED: CODE(1) 000402; DATA(0) 000203; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000041
0005	MAIN5	000524
0006	BODY1	000240

EXTERNAL REFERENCES (BLOCK, NAME)

0007	EXIT
0010	COS
0011	SIN
0012	NERR2$
0013	SQRT
0014	ATAN
0015	NEXP6$
0016	NWDU$
0017	NIO2$
0020	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000127	100F	0001	000004	11L	0001	000060	12L	0001	000035	125G	0001	000203	13L
0001	000204	14L	0001	000271	15L	0000	000131	200F	0001	000336	201G	0000	000145	500F
0000 R	000123	AA	0004	000000	ACH	0004 R	000037	ANGLE	0006 R	000170	CURV	0004	000013	DNU
0004	000016	DNU2	0004	000014	DT	0004 R	000012	DXI	0004	000017	DXINU	0004	000015	DXI2
0004 R	000034	ELL	0004	000025	EPS	0004	000030	ERR	0004	000006	GA	0004	000002	GAMMA
0004	000007	GB	0004	000010	GC	0004	000011	GD	0004	000040	GE	0004	000033	HST
0003	000012	I	0000	000164	INJP$	0003	000013	J	0003	000006	JA	0003	000021	JC
0003	000014	K	0003	000007	KA	0003	000017	LB	0003 I	000020	LE	0003 I	000010	M
0003	000000	MA	0003 I	000004	MC	0003	000002	MCM	0003	000015	M1	0003	000011	N
0003	000001	NA	0003	000005	NC	0003	000003	NCM	0005 R	000050	NU	0003	000016	N1
0006 R	000120	PHI	0004	000004	PR	0004	000021	RANGE	0004	000003	RE	0005	000144	S
0004	000022	SMIN	0005	000214	SN	0005	000264	ST	0004	000005	STAB	0005	000334	STN
0005	000404	SXI	0005	000454	SXIN	0000 R	000120	TANE	0004	000020	TIME	0004	000036	TW
0004	000001	U0	0005	000000	XI	0004 R	000035	XIMAX	0006 R	000000	YB	0000 R	000122	YBAR
0000 R	000124	YMAX	0000 R	000126	YY	0004	000024	YO	0006 R	000050	ZB	0000 R	000121	ZBAR
0000 R	000000	ZBY	0000 R	000050	ZBYY	0000 R	000125	ZMAX	0004 R	000023	ZO			

```
00101      1*            SUBROUTINE BODY
00101      2*      C
00101      3*      C     LIMITED TO ANALYTIC BODY SHAPE
00103      4*            PARAMETER MM=40,NN=60,JJ=4
```

```
00104      5*           REAL NU
00105      6*           DIMENSION ZBY(MM),ZBYY(MM)
00106      7*           COMMON/MAIN1/MA,NA,MC,NC,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      8*           COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00107      9*          1              NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00107     10*          2              ,XIMAX,TW,ANGLE,GE
00110     11*           COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00110     12*          1             SXIN(MM)
00111     13*           COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00111     14*      C
00112     15*        100 FORMAT(2I3,2F12.6)
00113     16*        200 FORMAT(1H1,20X,2HM=,10X,3HXI=,10X,3HZB=,10X,3HYB=,10X,4HZBY=,10X
00113     17*          1       ,5HCURV=)
00114     18*        500 FORMAT(20X,I2,5X,F8.4,12X,F6.3,6X,F9.5,5X,F9.5,5X,F6.3,6X,F9.5,5X
00114     19*          1       ,F9.5)
00114     20*      C
00115     21*           IF(LE.NE.0) GO TO 11
00117     22*           CALL EXIT
00120     23*          11 CONTINUE
00120     24*      C
00121     25*           PHI(2)=1.5708
00122     26*           ZB(2)=ZO+1./ELL
00123     27*           TANE=SIN(ANGLE)/COS(ANGLE)
00124     28*           DO 1 M=2,MC
00127     29*           YB(M)=YB(M-1)+DXI*SIN(PHI(M-1))
00130     30*           YB(2)=0.
00130     31*      C
00131     32*           GO TO (12,13,14),LE
00131     33*      C    ELLIPSOID AND CONE
00132     34*        12 ZBAR= ZO+TANE/(ELL*SQRT(ELL**2.+TANE**2.))
00133     35*           YBAR=ELL/SQRT(ELL**2.+TANE**2.)
00134     36*           AA=YBAR*ZBAR*TANE
00135     37*           IF(YB(M).LE.YBAR)ZB(M)=ZO+SQRT(1.-YB(M)**2.)/ELL
00137     38*           IF(YB(M).LE.YBAR)ZBY(M)=-YB(M)/ELL**2./(ZB(M)-ZO)
00141     39*           IF(YB(M).LE.YBAR)ZBYY(M)=-(1.+ELL**2.*ZBY(M)**2.)/ELL**2./
00141     40*          1        (ZB(M)-ZO)
00143     41*           IF(YB(M).GE.YBAR)ZB(M)=(YB(M)-AA)/TANE
00145     42*           IF(YB(M).GE.YBAR)ZBY(M)=1./TANE
00147     43*           IF(YB(M).GE.YBAR)ZBYY(M)=0.
00151     44*           GO TO 15
00152     45*          13
00152     46*      C    PARBOLOID AND CONE
00152     47*           GO TO 15
00153     48*          14
00153     49*      C    HYPERBOLOID
00153     50*           ELL=TANE
00154     51*           AA=1./ELL**2.
00155     52*           YMAX=XIMAX
00156     53*           ZMAX=SQRT((YMAX/ELL)**2.+AA**2.)
00157     54*           ZB(2)=ZMAX-SQRT((YB(2)/ELL)**2.+AA**2.)
00160     55*           ZB(M)=ZMAX-SQRT((YB(M)/ELL)**2.+AA**2.)
00161     56*           ZBY(M)=-YB(M)/ELL**2./(ZMAX-ZB(M))
00162     57*           ZBYY(M)=(-1.-(ELL*ZBY(M))**2.)/ELL**2./(ZMAX-ZB(M))
00163     58*           GO TO 15
00164     59*          15 CONTINUE
00165     60*           PHI(M)=PHI(2)-ATAN(ABS(ZBY(M)))
00166     61*           CURV(M)=ZBYY(M)/(1.+ZBY(M)**2.)**1.5
00166     62*      C    POSITIVE CURVATURE FOR CONVEX BODY IN THE Y DIRECTIONS
```

```
00167     63*            CURV(M)=ABS(CURV(M))
00167     64*      C
00170     65*          1 CONTINUE
00170     66*      C
00172     67*            CURV(1)=CURV(3)
00173     68*            PHI(1)=PHI(3)
00174     69*            YB(1)=YB(3)
00175     70*            ZB(1)=ZB(3)
00175     71*      C
00176     72*            WRITE(6,200)
00200     73*            DO 20 M=2,MC
00203     74*            YY=DXI*FLOAT(M-2)
00204     75*         20 WRITE(6,500)M,YY,ZB(M),YB(M),ZBY(M),CURV(M)
00215     76*            RETURN
00216     77*            END
00216     78*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A -(EXEC8 LEVEL E12U10010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:31

SUBROUTINE CONVR1 ENTRY POINT 000361

STORAGE USED: CODE(1) 000377; DATA(0) 000055; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000041
0005	MAIN3	000010
0006	DIFF1	045400
0007	MAIN5	000324
0010	BODY1	000240
0011	REGIN1	016040
0012	THERM1	016040

EXTERNAL REFERENCES (BLOCK, NAME)

0013	REGION
0014	SQRT
0015	EXP
0016	COS
0017	SIN
0020	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001		000023	123G	0001		000054	132G	0001		000134	140G	0001		000142	143G	0001	000221 161G
0001		000240	164G	0001		000276	201G	0001		000300	204G	0001		000301	207G	0001	000321 220G
0012	R	004540	A	0004	R	000000	ACH	0005		000005	AIN	0004		000037	ANGLE	0010	000170 CURV
0004	R	000013	DNU	0004		000016	DNU2	0004		000014	DT	0004	R	000012	DXI	0004	000017 DXINU
0004		000015	DXI2	0006	R	040640	E	0005	R	000003	EIN	0004		000034	ELL	0004	000025 EPS
0004		000030	ERR	0004		000006	GA	0004	R	000002	GAMMA	0004		000007	GB	0004	000010 GC
0004		000011	GD	0004		000040	GE	0011		000000	HH1	0011		004540	HH2	0011	011300 HH3
0005		000004	HIN	0004		000033	HST	0003		000012	I	0000		000013	INJPS	0003	I 000013 J
0003		000006	JA	0003		000021	JC	0003		000014	K	0003		000007	KA	0003	000017 LB
0003		000020	LE	0003	I	000010	M	0003		000000	MA	0003	I	000004	MC	0003	I 000002 MCM
0003		000015	M1	0003	I	000011	N	0003	I	000001	NA	0003	I	000005	NC	0003	I 000003 NCM
0000	I	000000	NI	0000	I	000001	NIM	0000	I	000002	NNI	0007	R	000050	NU	0003	000016 N1
0012	R	000000	P	0010	R	000120	PHI	0005	R	000000	PIN	0004		000004	PR	0006	R 000000 Q
0006	R	022600	R	0004		000021	RANGE	0004		000003	RE	0005	R	000001	RIN	0007	R 000144 S
0004		000022	SMIN	0007		000214	SN	0007		000264	ST	0004		000005	STAB	0007	000334 STN
0007	R	000404	SXI	0007		000454	SXIN	0012	R	011300	T	0004		000020	TIME	0005	000002 TIN
0004		000036	TW	0006	R	027340	U	0005		000006	UIN	0006	R	022600	UN	0004	000001 U0
0006	R	034100	V	0005		000007	VIN	0007		000000	XI	0004		000035	XIMAX	0010	000000 YB
0004		000024	YO	0010		000050	ZB	0004		000023	ZO						

00101 1* SUBROUTINE CONVR1

```
00101      2*      C
00103      3*            PARAMETER MM=40,NN=60,JJ=4
00104      4*            REAL NU
00105      5*            DIMENSION R(NN,MM),U(NN,MM),V(NN,MM),E(NN,MM)
00106      6*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      7*            COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00107      8*           1              NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00107      9*           2              ,XIMAX,TW,ANGLE,GE
00110     10*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00111     11*            COMMON/DIFF1/Q(NN,MM,JJ),UN(NN,MM,JJ)
00112     12*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00112     13*           1            SXIN(MM)
00113     14*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00114     15*            COMMON/REGIN1/WH1(NN,MM),WH2(NN,MM),WH3(NN,MM)
00115     16*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00116     17*            EQUIVALENCE (UN(1,1,1),R(1,1)),(UN(1,1,2),U(1,1)),(UN(1,1,3),V(
00116     18*           1             1,1)),(UN(1,1,4),E(1,1))
00116     19*      C
00117     20*            NC=3*NA
00120     21*            NCM=NC-1
00121     22*            DNU=1./FLOAT(NC-2)
00122     23*            DO 4 N=2,NC
00125     24*          4 NU(N)=DNU*FLOAT(N-2)
00127     25*            NI=2*NA
00130     26*            NIM=NI-1
00131     27*            DO 6 M=1,MC
00134     28*          6 S(M)=2.*S(M)
00136     29*            CALL REGION
00136     30*      C
00137     31*            DO 1 M=1,MC
00142     32*            DO 1 N=NI,NC
00145     33*            NNI=N-NI*2
00146     34*            P(N,M)=EXP(P(NNI,M))
00147     35*            A(N,M)=A(NNI,M)
00150     36*            T(N,M)=T(NNI,M)
00151     37*            Q(N,M,1)=EXP(R(NNI,M))
00152     38*            Q(N,M,2)=Q(N,M,1)*U(NNI,M)
00153     39*            Q(N,M,3)=Q(N,M,1)*V(NNI,M)
00154     40*            Q(N,M,4)=Q(N,M,1)*(E(NNI,M)+0.5*(U(NNI,M)**2.+V(NNI,M)**2.))
00155     41*          1 CONTINUE
00155     42*      C
00160     43*            DO 3 M=1,MC
00163     44*            DO 3 N=2,NIM
00166     45*            P(N,M)=1.
00167     46*            A(N,M)=SQRT(GAMMA)
00170     47*            T(N,M)=1.
00171     48*            Q(N,M,1)=1.
00172     49*            Q(N,M,2)=Q(N,M,1)*SQRT(GAMMA)*ACH*COS(PHI(M))
00173     50*            Q(N,M,3)=Q(N,M,1)*SQRT(GAMMA)*ACH*SIN(PHI(M))
00174     51*            Q(N,M,4)=Q(N,M,1)*(EIN/PIN*RIN+0.5*GAMMA*ACH**2.)
00175     52*          3 CONTINUE
00175     53*      C
00200     54*            DO 2 J=1,JJ
00203     55*            DO 2 M=1,MC
00206     56*            DO 2 N=2,NC
00211     57*            Q(N,M,J)=Q(N,M,J)*S(M)
00212     58*            UN(N,M,J)=Q(N,M,J)
00213     59*          2 CONTINUE
```

```
0C213     60*      C
0 217     61*           DO 5 M=3,MCM
0C222     62*         5 SXI(M)=(S(M+1)-S(M-1))/2./DXI
0C224     63*           SXI(MC)=2.*SXI(MCM)-SXI(MCM-1)
0C225     64*           SXI(1)=-SXI(3)
0C226     65*           SXI(2)=0.
0C226     66*      C
0C227     67*           RETURN
0C230     68*           END
0C230     69*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
@ FOR REGION,REGION                                                    25 JUN 72          5117132.688
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  *(EXEC8 LEVEL E120100610A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05117132

   SUBROUTINE REGION    ENTRY POINT 000115

   STORAGE USED: CODE(1) 000124; DATA(0) 000021; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   MAIN1  000022
    0004   BODY1  000240
    0005   MAIN5  000524
    0006   REGIN1 016040

   EXTERNAL REFERENCES (BLOCK, NAME)

    0007   COS
    0010   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000020 112G      0001   000034 115G      0001   000071 130G      0004 R 000170 CURV      0006 R 000000 HH1
    0006 R 004540 HH2       0006 R 011300 HH3       0003   000012 I         0000   000001 INJPS     0003   000013 J
    0003   000006 JA        0003   000021 JC        0003   000014 K         0003   000007 KA        0003 I 000017 LB*
    0003   000020 LE        0003 I 000010 M         0003   000000 MA        0003 I 000004 MC        0003   000002 MCM
    0003   000015 M1        0003 I 000011 N         0003   000001 NA        0003 I 000005 NC        0003   000003 NCM
    0005 R 000050 NU        0003   000016 N1        0004 R 000120 PHI       0005 R 000144 S         0005   000214 SN
    0005   000264 ST        0005   000334 STN       0005   000404 SXI       0005   000454 SXIN      0005   000000 XI
    0004 R 000000 YB        0004   000650 ZB

00101      1*            SUBROUTINE REGION
00101      2*      C
00103      3*            PARAMETER MM=40,NN=60,JJ=4
00104      4*            REAL NU
00105      5*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00106      6*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00107      7*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00107      8*           1          SXIN(MM)
00110      9*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00110     10*      C
00111     11*            DO 1 M=1,MC
00114     12*            DO 1 N=2,NC
00117     13*            HH1(N,M)=1.+CURV(M)*S(M)*(1.-NU(N))
00120     14*            HH2(N,M)=1.
00121     15*            HH3(N,M)=YB(M)+S(M)*(1.-NU(N))*COS(PHI(M))
00122     16*            IF(LB.EQ.0)HH3(N,M)=1.
00124     17*          1 CONTINUE
00124     18*      C
00127     19*            DO 2 N=2,NC
00132     20*            HH3(N,1)=HH3(N,3)
```

```
0( 133      21*              IF(LB.EQ.0)HH3(N,1)=1.
0( 135      22*          2   CONTINUE
0( 135      23*      C
0( 137      24*              RETURN
0( 140      25*              END
0( 140      26*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

SUBROUTINE DIFF ENTRY POINT 001506

STORAGE USED: CODE(1) 001531; DATA(0) 000243; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000041
0005	MAIN5	000524
0006	REGIN1	016040
0007	STRES1	000005
0010	HEAT1	000002
0011	CONR2	000023
0012	THERM1	016040
0013	DIFF1	045400
0014	DIFF2	000005

EXTERNAL REFERENCES (BLOCK, NAME)

0015	CONVR2
0016	HEAT
0017	STRESS
0020	WALL
0021	THERM
0022	NEXP6$
0023	SQRT
0024	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001		000752	11L	0001		000552	114L	0001		000421	12L	0001		000006	123G
0001		000644	13L	0001		000070	131G	0001		000127	134G	0001		000733	14L
0001		000537	232G	0001		000633	251G	0001		001065	304G	0001		001250	334G
0001		001311	347G	0001		001326	361G	0001		001327	364G	0001		001330	367G
0001		001352	403G	0001		001365	406G	0001		000002	5L	0001		001327	364G
0004		000037	ANGLE	0004	R	000013	DNU	0004		000016	DNU2	0004	R	000014	DT
0000	R	000137	DT2	0004	R	000012	DXI	0004		000017	DXINU	0004		000015	DXI2
0004		000025	EPS	0004		000030	ERR	0000	R	000000	F	0000	R	000114	FXI
0004		000006	GA	0004	R	000002	GAMMA	0004		000007	GB	0004		000010	GC
0004		000040	GE	0000	R	000120	GNU	0000	R	000110	H	0006	R	000000	HH1
0006	R	011300	HH3	0004		000033	HST	0011	R	000000	H1	0011	R	000013	H1NU
0011	R	000003	H12	0011	R	000606	H123	0011	R	000001	H2	0011		000016	H2NU
0011	R	000004	H23	0011	R	000002	H3	0011	R	000020	H3NU	0011	R	000017	H3XI
0011	R	000022	H3XIXI	0011	R	000005	H3I	0003		000012	I	0014	I	000000	II
0000		000162	INJP$	0003	I	000013	J	0003		000006	JA	0003		000021	JC
0003		000007	KA	0003	I	000017	LB	0003		000020	LE	0003	I	000010	M
0003	I	000004	MC	0003	I	000002	MCM	0000	I	000131	MI	0000	I	000133	ML
0003	I	000011	N	0003		000001	NA	0003	I	000005	NC	0003		000003	NCM
0000	I	000132	NL	0005	R	000050	NU	0003		000016	N1	0012	R	000000	P
0007	R	000001	PI12	0007	R	000002	PI21	0007	R	000003	PI22	0007	R	000004	PI33

0001		000042	126G	0001		000752	15L	0001		001251	337G	0001		001341	4L
0012	R	004540	A	0004	R	000000	ACH	0000	R	000135	DT1	0004		000034	ELL
0000	R	000114	FXI	0000	R	000044	G	0004		000011	GD	0006	R	004540	HH2
0011	R	000013	H1NU	0011		000015	H1XI	0011		000014	H2XI	0011	R	000021	H3XINU
0014	I	000000	II	0000	I	000140	III	0003		000014	K	0003		000000	MA
0000	I	000133	ML	0003		000015	M1	0000	I	000130	NI	0007	R	000000	PI11
0004		000004	PR												

```
0010 R 000000 Q1        0010 R 000001 Q2        0004    000021 RANGE     0004 R 000003 RE        0000 R 000136 REVARI
0000 R 000134 RR        0005 R 000144 S         0004    000022 SMIN      0005   000214 SN        0005 R 000264 ST
0004   000005 STAB      0005   000334 STN       0005 R 000404 SXI       0005   000454 SXIN      0012 R 011300 T
0004   000020 TIME      0004   000036 TW        0013 R 000000 U         0013 R 022600 UN        0014 R 000001 UT
0000 R 000124 UU        0004   000001 U0        0011 R 000007 U1        0011 R 000010 U2        0011 R 000011 U3
0011 R 000012 U4        0005   000000 XI        0004   000035 XIMAX     0004   000024 Y0        0004   000023 Z0
```

```
00101      1*          SUBROUTINE DIFF
00102      2*     C
00103      3*          PARAMETER MM=40,NN=60,JJ=4
00104      4*          REAL NU
00105      5*          DIMENSION F(3,3,JJ),G(3,3,JJ),H(JJ),FXI(JJ),GNU(JJ),UU(JJ)
00106      6*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      7*          COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00107      8*         1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00107      9*         2             ,XIMAX,TW,ANGLE,GE
00110     10*          COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00110     11*         1            SXIN(MM)
00111     12*          COMMON/REGION1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00112     13*          COMMON/STRESS1/PI11,PI12,PI21,PI22,PI33
00113     14*          COMMON/HEAT1/Q1,Q2
00114     15*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00114     16*         1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00115     17*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00116     18*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00117     19*          COMMON/DIFF2/II,UT(JJ)
00117     20*     C
00117     21*     C    SOLVE THE DIFFERENTIAL EQUATION
00117     22*     C
00120     23*          II=-1
00121     24*        5 CONTINUE
00122     25*          DO 1 N=3,NC
00125     26*          DO 1 M=2,MCM
00130     27*              DO 11 NI=1,3
00133     28*              DO 11 MI=1,3
00136     29*          IF(NI.NE.2.AND.MI.NE.2) GO TO 11
00140     30*          IF(II.EQ.-1.AND.MI+NI.GT.4.AND.N.NE.2) GO TO 11
00142     31*          IF(II.EQ.1.AND.MI+NI.LT.4.AND.N.NE.NC) GO TO 11
00144     32*              IF(NI.EQ.1)NL=N-1
00146     33*              IF(NI.EQ.2)NL=N
00150     34*              IF(NI.EQ.3)NL=N+1
00152     35*              IF(MI.EQ.1)ML=M-1
00154     36*              IF(MI.EQ.2)ML=M
00156     37*              IF(MI.EQ.3)ML=M+1
00160     38*          IF(NL.EQ.1.OR.NL.EQ.NC+1) GO TO 11
00160     39*     C
00162     40*          H1=HH1(NL,ML)
00163     41*          H2=HH2(NL,ML)
00164     42*          H3=HH3(NL,ML)
00165     43*          H12=H1*H2
00166     44*          H23=H2
00167     45*          H31=H1
00170     46*          H123=H12
00171     47*          IF(M.GE.4)H23=H2*H3
00173     48*          IF(M.GE.4)H31=H3*H1
```

```
00175     49*           IF(M.GE.4)H123=H12*H3
00175     50*     C
00177     51*           CALL CONVR2(NL,ML)
00200     52*           CALL HEAT(NL,ML)
00201     53*           CALL STRESS(NL,ML)
00201     54*     C       VECTORS IN THE PHYSICAL SPACE
00202     55*             F(NI,MI,1)=H23*U1*U2
00203     56*             F(NI,MI,2)=H23*(U1*U2*U2+PI11)
00204     57*             F(NI,MI,3)=H23*(U1*U2*U3+PI12)
00205     58*             F(NI,MI,4)=H23*((U1*U4+PI11)*U2+PI12*U3+Q1)
00205     59*     C
00206     60*           IF(MI.NE.2) GO TO 12
00210     61*             G(NI,MI,1)=H31*U1*U3
00211     62*             G(NI,MI,2)=H31*(U1*U2*U3+PI21)
00212     63*             G(NI,MI,3)=H31*(U1*U3*U3+PI22)
00213     64*             G(NI,MI,4)=H31*((U1*U4+PI22)*U3+PI21*U2+Q2)
00214     65*       12  CONTINUE
00214     66*     C
00214     67*     C       VECTORS IN THE COMPUTATIONAL PLANE
00214     68*     C
00214     69*     C
00215     70*           IF(NI.NE.2.OR.MI.NE.2) GO TO 13
00217     71*           RR=(1.-NU(NL))*SXI(ML)/S(ML)
00220     72*             H(1)=0.
00221     73*             H(2)=S(ML)*((-1./S(ML))*H1NU*(U1*U2*U3+PI12))
00222     74*             H(3)=S(ML)*(-(-1./S(ML))*H1NU*(U1*U2*U2+PI11))
00223     75*             H(4)=0.
00224     76*           IF(LB.EQ.0) GO TO 114
00226     77*           IF(LB.EQ.1.AND.M.NE.2) GO TO 114
00230     78*           H(3)=H(3)-S(ML)*H1*PI33*(-1./S(ML))*H3XINU/H3XI
00231     79*           DO 103 J=1,JJ
00234     80*      103  H(J)=H(J)*S(ML)*((-1./S(ML))*H3XINU*G(NI,MI,J)+(H3XIXI*
00234     81*          1     (1.-NU(NL))*(SXI(ML+1)-SXI(ML-1))/S(ML)**2.*H3NU)*F(NI,MI,J))/
00234     82*          2       H3XI
00236     83*             GO TO 13
00237     84*       114 CONTINUE
00240     85*             H(2)=H(2)-S(ML)*H2/H3*(H3XI+RR*H3NU)*PI33
00241     86*             H(3)=H(3)-S(ML)*H1/H3*(-1./S(ML))*H3NU*PI33
00242     87*           IF(M.GE.4)H(2)=H(2)*H3
00244     88*           IF(M.GE.4)H(3)=H(3)*H3
00246     89*           IF(M.GE.4) GO TO 13
00250     90*           DO 113 J=1,JJ
00253     91*      113  H(J)=H(J)*S(ML)/H3*((H3XI+RR*H3NU)*F(NI,MI,J)+(-1./S(ML))*
00253     92*          1          H3NU*G(NI,MI,J))
00255     93*       13  CONTINUE
00255     94*     C
00256     95*           IF(MI.NE.2) GO TO 14
00260     96*           G(NI,MI,1)=-G(NI,MI,1)*(1.-NU(NL))*SXI(ML)*F(NI,MI,1)
00260     97*          1                +(1.-NU(NL))*ST(ML)*U(NL,ML,1)/S(ML)*H123
00261     98*           G(NI,MI,2)=-G(NI,MI,2)*(1.-NU(NL))*SXI(ML)*F(NI,MI,2)
00261     99*          1                +(1.-NU(NL))*ST(ML)*U(NL,ML,2)/S(ML)*H123
00262    100*           G(NI,MI,3)=-G(NI,MI,3)*(1.-NU(NL))*SXI(ML)*F(NI,MI,3)
00262    101*          1                +(1.-NU(NL))*ST(ML)*U(NL,ML,3)/S(ML)*H123
00263    102*           G(NI,MI,4)=-G(NI,MI,4)*(1.-NU(NL))*SXI(ML)*F(NI,MI,4)
00263    103*          1                +(1.-NU(NL))*ST(ML)*U(NL,ML,4)/S(ML)*H123
00264    104*       14  CONTINUE
00264    105*     C
00265    106*           IF(NI.NE.2) GO TO 15
```

```
00267    107*            F(NI,MI,1)=S(ML)*F(NI,MI,1)
00270    108*            F(NI,MI,2)=S(ML)*F(NI,MI,2)
00271    109*            F(NI,MI,3)=S(ML)*F(NI,MI,3)
00272    110*            F(NI,MI,4)=S(ML)*F(NI,MI,4)
00273    111*         15 CONTINUE
00273    112*      C
00274    113*         11   CONTINUE
00274    114*      C
00277    115*            DT1=AMIN1(DXI/(ABS(U(N,M,2)/U(N,M,1))+A(N,M)),
00277    116*           1                 DNU*S(M)/(ABS(U(N,M,3)/U(N,M,1))+A(N,M)))/3.
00300    117*            REVARI=RE*(T(N,M)*0.5)/1.5/T(N,M)**1.5
00301    118*            DT2=(DNU*S(M))**2./4./(SQRT(GAMMA)*ACH/REVARI)/2.
00302    119*            DT=AMIN1(DT1,DT2)
00302    120*      C
00303    121*              DO 22 J=1,JJ
00306    122*              III=II
00306    123*      C
00307    124*              IF(N.EQ.NC)III=-1
00311    125*            GNU(J)=((III-1)*G(1,2,J)-2*II*G(2,2,J)+(II+1)*G(3,2,J))/2./DNU
00312    126*              II=III
00313    127*            FXI(J)=((III-1)*F(2,1,J)-2*II*F(2,2,J)+(II+1)*F(2,3,J))/2./DXI
00313    128*      C
00314    129*            IF(LB.EQ.1.AND.M.EQ.2)FXI(J)=2.*FXI(J)
00316    130*              UT(J)=-FXI(J)-GNU(J)-H(J)
00317    131*            UT(J)=UT(J)/HH1(N,M)/HH2(N,M)
00320    132*            IF(M.GE.4)UT(J)=UT(J)/HH3(N,M)
00322    133*            IF(II.EQ.-1)UN(N,M,J)=U(N,M,J)+UT(J)*DT
00324    134*            IF(II.EQ.1)UN(N,M,J)=0.5*(U(N,M,J)+UN(N,M,J)+UT(J)*DT)
00326    135*         22 CONTINUE
00326    136*      C
00330    137*         1  CONTINUE
00330    138*      C
00330    139*      C     EXTRAPOLATION TO THE AXIS OF SYMMETRY
00330    140*      C     EXTRAPOLATION TO OUTER BOUNDARY
00330    141*      C
00333    142*            DO 2 N=3,NC
00336    143*            DO 2 J=1,JJ
00341    144*            UN(N,MC,J)=2.*UN(N,MCM,J)-UN(N,MCM-1,J)
00342    145*         2  CONTINUE
00342    146*      C
00345    147*            CALL WALL
00345    148*      C
00345    149*      C
00345    150*      C     DEFINE MIRROR POINTS
00345    151*      C
00346    152*            DO 3 N=2,NC
00351    153*            UN(N,2,2)=0.
00352    154*            UN(N,1,1)=UN(N,3,1)
00353    155*            UN(N,1,2)=-UN(N,3,2)
00354    156*            UN(N,1,3)=UN(N,3,3)
00355    157*            UN(N,1,4)=UN(N,3,4)
00356    158*         3 CONTINUE
00356    159*      C
00356    160*      C     STORE VALUES TO DIFFERENT LEVEL
00356    161*      C
00356    162*      C
00356    163*      C
00360    164*            DO 4 J=1,JJ
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```
00363    165*            DO 4 M=1,MC
00366    166*            DO 4 N=2,NC
00371    167*            UU(J)=U(N,M,J)
00372    168*            U(N,M,J)=UN(N,M,J)
00373    169*            IF(II.EQ.1) GO TO 4
00375    170*            UN(N,M,J)=UU(J)
00376    171*          4 CONTINUE
00376    172*      C
00402    173*            DO 6 N=3,NC
00405    174*            DO 7 M=2,MC
00410    175*            CALL CONVR2(N,M)
00411    176*            U4=U4=0.5*(U2**2.+U3**2.)
00412    177*            CALL THERM(3,UI,U4,A(N,M))
00413    178*            CALL THERM(2,UI,U4,T(N,M))
00414    179*            CALL THERM(1.UI,U4,P(N,M))
00415    180*        7   CONTINUE
00415    181*      C
00417    182*            P(N,1)=P(N,3)
00420    183*            T(N,1)=T(N,3)
00421    184*            A(N,1)=A(N,3)
00422    185*        6   CONTINUE
00422    186*      C
00422    187*      C
00424    188*            IF(II.EQ.1) RETURN
00426    189*            II=1
00427    190*            GO TO 5
00427    191*      C
00430  *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00430    192*            END
```

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END OF COMPILATION: 1 DIAGNOSTICS.

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@ FOR WALL,WALL                                                    25 JUN 72          5117137.736
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:37

   SUBROUTINE WALL      ENTRY POINT 000033

   STORAGE USED: CODE(1) 000037; DATA(0) 000012; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   MAIN1  000022
    0004   MAIN2  000040
    0005   MAIN3  000010
    0006   DIFF1  045400
    0007   THERM1 016040

   EXTERNAL REFERENCES (BLOCK, NAME)

    0010   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000011 112G      0007   004540 A         0004   000000 ACH       0005   000005 AIN       0004   000037 ANGLE
    0004   000013 DNU       0004   000016 DNU2      0004   000014 DT        0004   000012 DXI       0004   000017 DXINU
    0004   000015 DXI2      0005 R 000003 EIN       0004   000034 ELL       0004   000025 EPS       0004   000030 ERR
    0004   000006 GA        0004   000002 GAMMA     0004   000007 GB        0004   000010 GC        0004   000011 GD
    0005   000004 HIN       0004   000033 HST       0003   000012 I         0000   000001 INJP$     0003   000013 J
    0003   000006 JA        0003   000021 JC        0003   000014 K         0003   000007 KA        0003   000017 LB
    0003   000020 LE        0003 I 000010 M         0003   000000 MA        0003 I 000004 MC        0003   000002 MCM
    0003   000015 M1        0003   000011 N         0003   000001 NA        0003 I 000005 NC        0003   000003 NCM
    0003   000016 N1        0007   000000 P         0005 R 000000 PIN       0004   000004 PR        0004   000021 RANGE
    0004   000003 RE        0005 R 000001 RIN       0004   000022 SMIN      0004   000005 STAB      0007   011300 T
    0004   000020 TIME      0005   000002 TIN       0004 R 000036 TW        0006   000000 U         0005   000006 UIN
    0006 R 022600 UN        0004   000001 U0        0005   000007 VIN       0004   000035 XIMAX     0004   000024 YO
    0004   000023 ZO


00101      1*            SUBROUTINE WALL
00101      2*      C
00103      3*            PARAMETER MM=40,NN=60,JJ=4
00104      4*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00105      5*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00105      6*           1             NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00105      7*           2             ,XIMAX,TW,ANGLE
00106      8*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00107      9*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00110     10*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00110     11*      C
00110     12*      C
00111     13*            DO 8 M=2,MC
00114     14*            UN(NC,M,2)=0.
00115     15*            UN(NC,M,3)=0.
```

```
00116     16*            UN(NC,M,4)=UN(NC,M,1)*TW*EIN/PIN*RIN
00117     17*         8  CONTINUE
00117     18*      C
00121     19*            RETURN
00122  *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00122     20*            END

      END OF COMPILATION:          1 DIAGNOSTICS.
```

```
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05117138

   SUBROUTINE STRESS    ENTRY POINT 000470

   STORAGE USED: CODE(1) 000503; DATA(0) 000052; BLANK COMMON(2) 000003

    COMMON BLOCKS:

    0003   MAIN1  000022
    0004   MAIN2  000041
    0005   MAIN5  000524
    0006   DIFF1  045400
    0007   CONR2  000023
    0010   REGIN1 016040
    0011   THERM1 016040
    0012   STRES1 000005

   EXTERNAL REFERENCES (BLOCK, NAME)

    0013   NEXP6$
    0014   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0011    004540 A          0004 R 000000 ACH        0004    000037 ANGLE      0000 R 000012 AP1        0004 R 000013 DNU
    0004    000016 DNU2       0004    000014 DT        0004 R 000012 DXI        0004    000017 DXINU     0004    000015 DXI2
    0004    000034 ELL        0004    000025 EPS       0004    000030 ERR       0000 R 000013 E11        0000 R 000016 E12
    0000 R 000017 E21         0000 R 000014 E22        0000 R 000015 E33        0004    000006 GA        0004 R 000002 GAMMA
    0004    000007 GB         0004    000010 GC        0004    000011 GD        0004    000040 GE        0010 R 000000 HH1
    0010 R 004540 HH2         0010    011300 HH3       0004    000033 HST       0007 R 000000 H1         0007 R 000013 H1NU
    0007    000015 H1XI       0007    000003 H12       0007    000006 H123      0007 R 000001 H2         0007 R 000016 H2NU
    0007 R 000014 H2XI        0007    000004 H23       0007 R 000002 H3         0007 R 000020 H3NU       0007 R 000017 H3XI
    0007 R 000021 H3XINU      0007    000022 H3XIXI    0007    000005 H31       0003    000012 I         0000 I 000000 II
    0000 I 000002 III         0000    000026 INJP$     0003    000013 J         0003    000006 JA        0003    000021 JC
    0003    000014 K          0003    000007 KA        0003 I 000017 LB         0003    000020 LE        0003    000000 MA
    0003 I 000004 MC          0003    000002 MCM       0003    000015 M1        0003    000001 NA        0003 I 000005 NC
    0003    000003 NCM        0005 R 000050 NU         0003    000016 N1        0011 R 000000 P          0012 R 000000 PI11
    0012 R 000001 PI12        0012 R 000002 PI21       0012 R 000003 PI22       0012 R 000004 PI33       0004    000004 PR
    0004    000021 RANGE      0004 R 000003 RE         0000 R 000011 REVARI     0000 R 000001 RR         0005 R 000144 S
    0004    000022 SMIN       0005    000214 SN        0005    000264 ST        0004    000005 STAB      0005    000334 STN
    0005 R 000404 SXI         0005    000454 SXIN      0011 R 011300 T          0004    000020 TIME      0004    000036 TW
    0006 R 000000 U           0006    022600 UN        0000 R 000003 UNU        0000 R 000005 UOH1NU     0000 R 000007 UXI
    0004    000001 UO         0007    000007 U1        0007 R 000010 U2         0007 R 000011 U3         0007    000012 U4
    0000 R 000004 VNU         0000 R 000006 VOH2NJ     0000 R 000010 VOH2XI     0003    000010 X         0005    000000 XI
    0004    000035 XIMAX      0003    000011 Y         0004    000024 YO        0004    000023 ZO

00101      1*            SUBROUTINE STRESS(N,M)
00101      2*      C
00103      3*            PARAMETER MM=40,NN=60,JJ=4
```

```
00104      4*            REAL NU
00105      5*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,X,Y,I,J,K,M1,N1,LB,LE,JC
00106      6*            COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106      7*           1              NU2,DXINU,TIME,RANGE,SMIN,ZO,YO,EPS(3),ERR(3),HST,ELL
00106      8*           2              ,XIMAX,TW,ANGLE,GE
00107      9*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00107     10*           1            SXIN(MM)
00110     11*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00111     12*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00111     13*           1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00112     14*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00113     15*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00114     16*            COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00115     17*            II=0
00115     18*      C
00116     19*            RR=(1.-NU(N))*SXI(M)/S(M)
00116     20*      C
00117     21*            III=II
00120     22*            IF(N.EQ.2) II=1
00122     23*            IF(N.EQ.NC) II=-1
00124     24*            UNU=((II-1)*U(N-1,M,2)/J(N-1,M,1)-2*II*U(N,M,2)/U(N,M,1)
00124     25*           1     +(II+1)*U(N+1,M,2)/U(N+1,M,1))/2./DNU
00125     26*            VNU=((II-1)*U(N-1,M,3)/J(N-1,M,1)-2*II*U(N,M,3)/U(N,M,1)
00125     27*           1     +(II+1)*U(N+1,M,3)/U(N+1,M,1))/2./DNU
00126     28*            UOH1NU=((II-1)*U(N-1,M,2)/U(N-1,M,1)/HH1(N-1,M)-2*II*U(N,M,2)/
00126     29*           1     U(N,M,1)/HH1(N,M)+(II+1)*U(N+1,M,2)/U(N+1,M,1)/HH1(N+1,M))/2.
00126     30*           2     /DNU
00127     31*            VOH2NU=((II-1)*U(N-1,M,3)/U(N-1,M,1)/HH2(N-1,M)-2*II*U(N,M,3)/
00127     32*           1     U(N,M,1)/HH2(N,M)+(II+1)*U(N+1,M,3)/U(N+1,M,1)/HH2(N+1,M))/2.
00127     33*           2     /DNU
00130     34*            II=III
00130     35*      C
00131     36*            III=II
00132     37*            IF(M.EQ.1)II=1
00134     38*            IF(M.EQ.3)II=-1
00136     39*            IF(M.EQ.MC)II=-1
00140     40*            UXI=((II-1)*U(N,M-1,2)/J(N,M-1,1)-2*II*U(N,M,2)/U(N,M,1)
00140     41*           1     +(II+1)*U(N,M+1,2)/U(N,M+1,1))/2./DXI
00141     42*            VOH2XI=((II-1)*U(N,M-1,3)/U(N,M-1,1)/HH2(N,M-1)-2*II*U(N,M,3)/
00141     43*           1     U(N,M,1)/HH2(N,M)+(II+1)*U(N,M+1,3)/U(N,M+1,1)/HH2(N,M+1))/
00141     44*           2     2./DXI
00142     45*            II=III
00142     46*      C
00143     47*            REVARI=RE*(T(N,M)+0.5)/1.5/T(N,M)**1.5
00144     48*            AP1=GAMMA**0.5*ACH/REVARI
00145     49*            E11=2.*AP1*((UXI+RR*UNU)/H1+U3/H1/H2*H1NU*(-1./S(M)))
00146     50*            E22=2.*AP1*((-1./S(M))*VNU/H2+U2/H1/H2*(H2XI+RR*H2NU))
00147     51*            E33=2.*AP1*((H3XI+RR*H3NU)/H1/H3*U2+(-1./S(M))*H3NU/H2/H3*U3)
00150     52*            IF(LB.EQ.1.AND.M.EQ.2)E33=2.*AP1*((UXI+RR*UNU)/H1+U3*H2*(-1./S(M)
00150     53*           1     )*H3XINU/H3XI)
00152     54*            E12=AP1*(H2/H1*(VOH2XI+RR*VOH2NU)+H1/H2*(-1./S(M))*UOH1NU)
00153     55*            E21=E12
00153     56*      C
00154     57*            PI11=P(N,M)-E11+1./3.*(E11+E22+E33)
00155     58*            PI22=P(N,M)-E22+1./3.*(E11+E22+E33)
00156     59*            PI33=P(N,M)-E33+1./3.*(E11+E22+E33)
00157     60*            PI12=-E12
00160     61*            PI21=-E21
```

```
00160      62*      C
00160      63*      C
00161      64*               RETURN
00162      65*               END
00162      66*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
@ FOR HEAT,HEAT                                                    25 JUN 72          5117140.712
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  *(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:40

   SUBROUTINE HEAT      ENTRY POINT 000217

   STORAGE USED: CODE(1) 000226; DATA(0) 000026; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   MAIN1  000022
    0004   MAIN2  000041
    0005   MAIN5  000524
    0006   THERM1 016040
    0007   CONR2  000023
    0010   HEAT1  000002

   EXTERNAL REFERENCES (BLOCK, NAME)

    0011   NEXP6$
    0012   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0006   004540 A          0004 R 000000 ACH        0004   000037 ANGLE      0000 R 000005 AP2        0004 R 000013 DNU
    0004   000016 DNU2       0004   000014 DT         0004 R 000012 DXI        0004   000017 DXINU      0004   000015 DXI2
    0004   000034 ELL        0004   000025 EPS        0004   000030 ERR        0004   000006 GA         0004 R 000002 GAMMA
    0004   000007 GB         0004   000010 GC         0004   000011 GD         0004   000040 GE         0004   000033 HST
    0007 R 000000 H1         0007   000013 H1NU       0007   000015 H1XI       0007   000003 H12        0007   000006 H123
    0007 R 000001 H2         0007   000016 H2NU       0007   000014 H2XI       0007   000004 H23        0007   000002 H3
    0007   000020 H3NU       0007   000017 H3XI       0007   000021 H3XINU     0007   000022 H3XIXI     0007   000005 H31
    0003   000012 I          0000 I 000000 II         0000 I 000001 III        0000   000012 INJPS      0003   000013 J
    0003   000006 JA         0003   000021 JC         0003   000014 K          0003   000007 KA         0003   000017 LB
    0003   000020 LE         0003   000000 MA         0003 I 000004 MC         0003   000002 MCM        0003   000015 M1
    0003   000001 NA         0003 I 000005 NC         0003   000003 NCM        0005 R 000050 NU         0003   000016 N1
    0006   000000 P          0004 R 000004 PR         0000 R 000002 QQ1        0000 R 000003 QQ2        0010 R 000000 Q1
    0010 R 000001 Q2         0004   000021 RANGE      0004 R 000003 RE         0000 R 000004 REVARI     0005 R 000144 S
    0004   000022 SMIN       0005   000214 SN         0005   000264 ST         0004   000005 STAB       0005   000334 STN
    0005 R 000404 SXI        0005   000454 SXIN       0006 R 011300 T          0004   000020 TIME       0004   000036 TW
    0004   000001 U0         0007   000007 U1         0007   000010 U2         0007   000011 U3         0007   000012 U4
    0003   000010 X          0005   000000 XI         0004   000035 XIMAX      0003   000011 Y          0004   000024 Y0
    0004   000023 Z0

00101      1*              SUBROUTINE HEAT(N,M)
00101      2*        C
00103      3*              PARAMETER MM=40,NN=60,JJ=4
00104      4*              REAL NU
00105      5*              COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,X,Y,I,J,K,M1,N1,LB,LE,JC
00106      6*              COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106      7*             1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00106      8*             2             ,XIMAX,TW,ANGLE,GE
```

```
00107      9*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00107     10*           1           SXIN(MM)
00110     11*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00111     12*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00111     13*           1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00112     14*            COMMON/HEAT1/Q1,Q2
00112     15*      C
00113     16*            II=0
00113     17*      C
00114     18*            III=II
00115     19*            IF(M.EQ.1)II=1
00117     20*            IF(M.EQ.3)II=-1
00121     21*            IF(M.EQ.MC)II=-1
00123     22*            QQ1=((II-1)*T(N,M-1)-2*II*T(N,M)+(II+1)*T(N,M+1))/2./DXI
00124     23*            II=III
00124     24*      C
00125     25*            III=II
00126     26*            IF(N.EQ.NC) II=-1
00130     27*            IF(N.EQ.2) II=1
00132     28*            QQ2=((II-1)*T(N-1,M)-2*II*T(N,M)+(II+1)*T(N+1,M))/2./DNU
00133     29*            II=III
00133     30*      C
00133     31*      C
00134     32*            REVARI=RE*(T(N,M)*0.5)/1.5/T(N,M)**1.5
00135     33*            AP2=GAMMA**1.5*ACH/(GAMMA-1.)/REVARI/PR
00136     34*            Q2=-AP2*QQ2*(-1.)/S(M)/H2
00137     35*            Q1=-AP2*(QQ1+(1.-NU(N))*SXI(M)/S(M)*QQ2)/H1
00137     36*      C
00137     37*      C
00140     38*            RETURN
00141     39*            END
00141     40*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
@ FOR CONVR2,CONVR2                                                    25 JUN 72          5117142.201
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:42

   SUBROUTINE CONVR2    ENTRY POINT 000170

   STORAGE USED: CODE(1) 000203; DATA(0) 000021; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   MAIN1  000022
    0004   MAIN2  000041
    0005   MAIN5  000524
    0006   REGIN1 016040
    0007   DIFF1  045400
    0010   CONR2  000023
    0011   BODY1  000240

   EXTERNAL REFERENCES (BLOCK, NAME)

    0012   COS
    0013   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0004   000000 ACH       0004   000037 ANGLE      0011 R 000170 CURV      0004   000013 DNU       0004   000016 DNU2
    0004   000014 DT        0004 R 000012 DXI        0004   000017 DXINU     0004   000015 DXI2      0004   000034 ELL
    0004   000025 EPS       0004   000030 ERR        0004   000006 GA        0004   000002 GAMMA     0004   000007 GB
    0004   000010 GC        0004   000011 GD         0004   000040 GE        0006 R 000000 HH1       0006   004540 HH2
    0006 R 011300 HH3       0004   000033 HST        0010   000000 H1        0010 R 000013 H1NU      0010 R 000015 H1XI
    0010   000003 H12       0010   000006 H123       0010   000001 H2        0010 R 000016 H2NU      0010 R 000014 H2XI
    0010   000004 H23       0010   000002 H3         0010 R 000020 H3NU      0010 R 000017 H3XI      0010 R 000021 H3XINU
    0010 R 000022 H3XIXI    0010   000005 H31        0003   000012 I         0000   000001 INJPS     0003   000013 J
    0003   000006 JA        0003   000021 JC         0003   000014 K         0003   000007 KA        0003 I 000017 LB
    0003   000020 LE        0003   000000 MA         0003 I 000004 MC        0003 I 000002 MCM       0003   000015 M1
    0003   000001 NA        0003   000005 NC         0003   000003 NCM       0005 R 000050 NU        0003   000016 N1
    0011 R 000120 PHI       0004   000004 PR         0004   000021 RANGE     0004   000003 RE        0005 R 000144 S
    0004   000022 SMIN      0005   000214 SN         0005   000264 ST        0004   000005 STAB      0005   000334 STN
    0005   000404 SXI       0005   000454 SXIN       0004   000020 TIME      0004   000036 TW        0007 R 000000 U
    0007   022600 UN        0004   000001 U0         0010 R 000007 U1        0010 R 000010 U2        0010 R 000011 U3
    0010 R 000012 U4        0003   000010 X          0005   000000 XI        0004   000035 XIMAX     0003   000011 Y
    0011   000000 YB        0004   000024 Y0         0011   000050 ZB        0004   000023 Z0


00101      1*            SUBROUTINE CONVR2(N,M)
00103      2*            PARAMETER MM=40,NN=60,JJ=4
00104      3*            REAL NU
00105      4*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,X,Y,I,J,K,M1,N1,LB,LE,JC
00106      5*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00106      6*           1             NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00106      7*           2             ,XIMAX,TW,ANGLE,GE
00107      8*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
```

```
00107      9*           1           SXIN(MM)
00110     10*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00111     11*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00112     12*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00112     13*           1              H2NU,H3XI,H3NU,H3XINU,H3XIXI
00113     14*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00113     15*      C
00113     16*      C
00113     17*      C     U1=RHO,U2=U,U3=V,U4=E+.5*Q**2.
00114     18*            U1=U(N,M,1)/S(M)
00115     19*            U2=U(N,M,2)/U(N,M,1)
00116     20*            U3=U(N,M,3)/U(N,M,1)
00117     21*            U4=U(N,M,4)/U(N,M,1)
00117     22*      C
00117     23*      C
00117     24*      C     EASIER TO CALCULATE H1XI AND H3XI THIS WAY
00120     25*            H1XI=(HH1(N,M+1)-HH1(N,M-1))/2./DXI
00121     26*            IF(M.EQ.MC)H1XI=(HH1(N,MC)-HH1(N,MCM))/DXI
00123     27*            H1NU=-CURV(M)*S(M)
00124     28*            H2XI=0.
00125     29*            H2NU=0.
00126     30*            H3XI=(HH3(N,M+1)-HH3(N,M-1))/2./DXI*LB
00127     31*            IF(M.EQ.1)H3XI=(HH3(N,4)-HH3(N,2))/2./DXI *LB
00131     32*            IF(M.EQ.MC)H3XI=(HH3(N,MC)-HH3(N,MCM))/DXI*LB
00133     33*            H3NU=-S(M)*COS(PHI(M))*LB
00134     34*            IF(M.EQ.1)H3NU=S(1)*COS(PHI(1))*LB
00136     35*            H3XIXI=0.
00137     36*            H3XINU=-S(M)*LB
00137     37*      C
00140     38*            RETURN
00141     39*            END
00141     40*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A *(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:43

SUBROUTINE THERM ENTRY POINT 000107

STORAGE USED: CODE(1) 000122; DATA(0) 000021; BLANK COMMON(2) 000007

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN3	000010
0005	CONR2	000023

EXTERNAL REFERENCES (BLOCK, NAME)

0006	GAMAR
0007	NERR2$
0010	SQRT
0011	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001_1	000076	10L	0001_1	000030	10_1L	0001_1	000040	102_1L	0001_1	000050	103_1L	0001_1	000067	104_1L
0004	000005	AIN	0004	000003	EIN	0000 R	000000	EOEIN	0006 R	000000	GAMAR	0000 R	000002	GAMMA
0004	000004	HIN	0000 R	000007	HOHIN	0005	000000	H1	0005	000013	H1NU	0005	000015	H1XI
0005	000003	H12	0005	000006	H123	0005	000001	H2	0005	000016	H2NU	0005	000014	H2XI
0005	000004	H23	0005	000002	H3	0005	000020	H3NU	0005	000017	H3XI	0005	000021	H3XINU
0005	000022	H3XIXI	0005	000005	$H3_1$	0003	000012	I	0000	000012	INJPS	0003	000013	J
0003	000006	JA	0003	0000_{21}	JC	0003	0000_{14}	K	0003	000007	KA	0003	0000_{17}	LB
0003	000020	LE	0003	000010	M	0003	000000	MA	0003	000004	MC	0003	000002	MCM
0003	000015	M1	0003	000011	N	0003	000001	NA	0003	000005	NC	0003	000003	NCM
0003	000016	N1	0004 R	000000	PIN	0000 R	000004	POPIN	0000 R	000003	R	0004 R	000001	RIN
0000 R	000001	RORIN	0000 R	000006	SOUND	0004 R	000002	TIN	0000 R	000005	TOTIN	0004	000006	UIN
0005	000007	U1	0005	000010	U2	0005	000011	U3	0005	000012	U4	0004	000007	VIN

```
00101      1*            SUBROUTINE THERM(NN,X,Y,STOR)
00101      2*      C     DEFINE OTHER THERMODYNAMIC PROPERTIES
00101      3*      C
00103      4*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00104      5*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00105      6*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00105      7*           1             H2NU,H3XI,H3NU,H3XINU,H3XIXI
00105      8*      C
00106      9*            EOEIN=Y*PIN/RIN
00107     10*            RORIN=X*RIN
00110     11*            GAMMA=GAMAR(RORIN,EOEIN)
00110     12*      C
00111     13*            R=3089.67/1.8
00111     14*      C
00112     15*            GO TO (101,102,103,104),NN
```

```
00112     16*      C      PRESSURE
00113     17*       101   POPIN=(GAMMA-1.)*RORIN*EOEIN
00114     18*             STOR=POPIN/PIN
00115     19*             GO TO 10
00115     20*      C      TEMPERATURE
00116     21*       102   TOTIN=(GAMMA-1.)*EOEIN/R
00117     22*             STOR=TOTIN/TIN
00120     23*             GO TO 10
00120     24*      C      SOUND SPEED
00121     25*       103   SOUND=GAMMA*(GAMMA-1.)*EOEIN
00122     26*             SOUND=ABS(SOUND)
00123     27*             STOR=SQRT(SOUND/PIN*RIN)
00124     28*             GO TO 10
00124     29*      C      ENTHALPY
00125     30*       104   HOHIN=EOEIN+GAMMA
00126     31*             STOR=HOHIN/PIN*RIN
00127     32*             GO TO 10
00127     33*      C
00130     34*        10   STOR=ABS(STOR)
00131     35*             RETURN
00132     36*             END
00132     37*      C
00132     38*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
@ FOR GAMA,GAMA
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  *(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:44

   FUNCTION GAMAR       ENTRY POINT 000011

   STORAGE USED: CODE(1) 000013; DATA(0) 000007; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000000 GAMAR      0000   000002 INJP$


00101      1*            FUNCTION GAMAR(RHO,EE)
00103      2*            GAMAR=1.4
00104      3*            RETURN
00105      4*            END
00105      5*     C
00105      6*     C

      END OF COMPILATION:       NO  DIAGNOSTICS.
```

```
@ FOR GAMAR,GAMAR                                                    25 JUN 72          5117145.413
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A  -(EXEC8 LEVEL E12U10010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05117145

   FUNCTION GAMAR       ENTRY POINT 000106

   STORAGE USED: CODE(1) 000110; DATA(0) 000034; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   ALOG10
    0004   NEXP6$
    0005   EXP
    0006   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000007 DELT1     0000 R 000005 E         0000 R 000002 ECON      0000 R 000011 ED        0000 R 000006 E1
    0000 R 000010 F1        0000 R 000000 GAMAR     0000 R 000012 GAMFR1    0000   000025 INJP$     0000 R 000004 R
    0000 R 000001 RCON      0000 R 000003 ROZERO

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00101      1*            FUNCTION GAMAR(RHO,EE)
00103      2*            DATA RCON,ECON/.516,.932E-7/
00106      3*            DATA ROZERO/1.2E-3/
00106      4*      C
00110      5*            R=RHO/ROZERO*RCON
00111      6*            E=EE*ECON
00112      7*            E1=8.5+.357*ALOG10(R)
00113      8*            DELT1=.975*R**.05
00114      9*            F1=0.
00115     10*            ED=(E-E1)/DELT1
00116     11*            IF(ED.LT.741.66)F1=1./(EXP(ED)+1.)
00120     12*            GAMFR1=(.161+.255*F1*EXP(-.224215*E))*R**(.048*F1*ALOG10(E))
00121     13*            GAMAR=GAMFR1+1.
00121     14*      C
00122     15*            RETURN
00123     16*            END
00123     17*      C
00123     18*      C

      END OF COMPILATION:       NO  DIAGNOSTICS.
```

UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:46

SUBROUTINE ACHEM ENTRY POINT 000306

STORAGE USED: CODE(1) 000322; DATA(0) 000031; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN2	000041
0004	MAIN3	000010

EXTERNAL REFERENCES (BLOCK, NAME)

0005	EXIT
0006	NWDU$
0007	NIO2$
0010	NERR2$
0011	ALOG
0012	EXP
0013	SQRT
0014	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000011	10L	0001	000050	100L	0001	000063	101L	0001	000106	102L	0001	000126	103L
0001	000155	104L	0001	000014	11L	0001	000020	12L	0001	000030	13L	0001	000201	200L
0001	000225	201L	0001	000251	202L	0001	000256	203L	0001	000220	204L	0001	000273	205L
0000	000011	9F	0003	000000	ACH	0004	000005	AIN	0003	000037	ANGLE	0003	000013	DNU
0003	000016	DNU2	0003	000014	DT	0003	000012	DXI	0003	000017	DXINU	0003	000015	DXI2
0004	000003	EIN	0003	000034	ELL	0003	000025	EPS	0003	000030	ERR	0003 R	000006	GA
0003 R	000002	GAMMA	0003	000007	GB	0003	000010	GC	0003	000011	GD	0003	000040	GE
0004	000004	HIN	0003	000033	HST	0000	000023	INJP$	0000 I	000004	L	0000 I	000000	NN
0000 I	000010	NNN	0004 R	000000	PIN	0000 R	000003	POPIN	0003	000004	PR	0000 R	000003	R
0003	000021	RANGE	0003	000003	RE	0004 R	000001	RIN	0000 R	000006	RORIN	0000 R	000007	RR
0003	000022	SMIN	0003	000005	STAB	0003	000020	TIME	0004	000002	TIN	0003	000036	TW
0004	000006	UIN	0003	000001	U0	0004	000007	VIN	0003	000035	XIMAX	0000 R	000001	XX
0000 R	000002	YY	0003	000024	Y0	0003	000023	Z0						

```
00101      1*          SUBROUTINE ACHEM(N,X,Y,STOR)
00101      2*     C
00103      3*          COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00103      4*         1          NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00103      5*         2          ,XIMAX,TW,ANGLE,GE
00104      6*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00104      7*     C
00105      8*          NN=N                                                    092S2308
00106      9*          XX=X                                                    092S2309
00107     10*          YY=Y                                                    092S2310
00110     11*          IF(NN)12,10,11                                          092S2311
```

```
00113     12*       10 RETURN                                                    09252312
00114     13*       11 IF(NN-20)13,13,12                                         09252313
00117     14*       12 WRITE(6,9)NN                                              09252314
00122     15*        9 FORMAT(//1H041X33HCODE FOR AIR CHEMISTRY INCORRECT=I4)    09252315
00123     16*          CALL EXIT                                                 09252316
00124     17*       13 R=3089.67/1.8
00125     18*          L=((NN-2)/5+1)
00126     19*          GO TO (100,200),L
00127     20*      100 GO TO(12,101,102,104,103),NN
00130     21*      101 POPIN=XX/PIN                                             09252321
00131     22*          RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                        09252322
00132     23*          STOR=GA*XX/(RORIN*RIN)                                   09252323
00133     24*          GO TO 10                                                 09252324
00134     25*      102 POPIN=XX/PIN                                             09252325
00135     26*          RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)
00136     27*          STOR=RORIN*RIN                                           09252327
00137     28*          GO TO 10                                                 09252328
00140     29*      103 POPIN=XX/PIN                                             09252329
00141     30*          RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                        09252330
00142     31*          STOR=SQRT(GAMMA*XX/(RORIN*RIN))                          09252331
00143     32*          GO TO 10                                                 09252332
00144     33*      104 POPIN=XX/PIN
00145     34*          RORIN=EXP((ALOG(POPIN)-YY)/GAMMA)                        09252326
00146     35*          RR=RORIN*RIN
00147     36*          STOR=XX/RR/R
00150     37*          GO TO 10
00151     38*      200 NNN=NN-5                                                 09252333
00152     39*          GO TO(12,201,202,204,203,205),NNN
00153     40*      204 STOR=YY/GA/R                                             09252335
00154     41*          GO TO 10                                                 09252336
00155     42*      201 RR=GA*XX/YY                                              09252337
00156     43*          RORIN=RR/RIN                                             09252338
00157     44*          POPIN=XX/PIN                                             09252339
00160     45*          STOR=ALOG(POPIN)-GAMMA*ALOG(RORIN)                       09252340
00161     46*          GO TO 10                                                 09252341
00162     47*      202 STOR=GA*XX/YY                                            09252342
00163     48*          GO TO 10                                                 09252343
00164     49*      203 RR=GA*XX/YY                                              09252344
00165     50*          STOR=SQRT(GAMMA*XX/RR)                                   09252345
00166     51*          GO TO 10                                                 09252346
00167     52*      205 STOR=YY/GAMMA
00170     53*          GO TO 10
00171     54*          END
00171     55*      C

      END OF COMPILATION:       NO  DIAGNOSTICS.
```

UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A *(EXEC8 LEVEL E120100104)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05:17:48

SUBROUTINE OUTPUT ENTRY POINT 000375

STORAGE USED: CODE(1) 000410; DATA(0) 000222; BLANK COMMON(2) 00000

COMMON BLOCKS:

0003	MAIN1	000022
0004	MAIN2	000041
0005	MAIN3	000010
0006	MAIN5	000524
0007	DIFF1	045400
0010	CONR2	000023
0011	THERM1	016040
0012	SHOCK1	000170

EXTERNAL REFERENCES (BLOCK, NAME)

0013	CONVR2
0014	NWDU$
0015	NIO2$
0016	SQRT
0017	NEXP6$
0020	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000063	100F	0000	000064	101F	0000	000106	102F	0000	000112	103F	0000	000131	104F
0000	000143	106F	0000	000145	111F	0001	000026	137G	0001	000050	154G	0001	000106	167G
0011 R	004540	A	0004 R	000000	ACH	0005	000005	AIN	0004	000037	ANGLE	0000 R	000052	A2
0000 R	000000	CF	0000 R	000062	CH	0000 R	000057	DAM	0000 R	000056	DHSTAG	0004 R	000013	DNU
0004	000016	DNU2	0004 R	000014	DT	0000 R	000053	DUM	0000 R	000050	DUM2	0004 R	000012	DXI
0004	000017	DXINU	0004	000015	DXI2	0005	000003	EIN	0004	000034	ELL	0004	000025	EPS
0004	000030	ERR	0004 R	000006	GA	0004 R	000002	GAMMA	0004	000007	GB	0004	000010	GC
0004	000011	GD	0004	000040	GE	0000 R	000055	HH	0005 R	000004	HIN	0004	000033	HST
0010	000000	H1	0010	000013	H1NU	0010	000015	H1XI	0010	000003	H12	0010	000006	H123
0010	000001	H2	0010	000016	H2NU	0010	000014	H2XI	0010	000004	H23	0010	000002	H3
0010	000020	H3NU	0010	000017	H3XI	0010	000021	H3XINU	0010	000022	H3XIXI	0010	000005	H31
0003	000012	I	0000	000176	INJPS	0003	000013	J	0003	000006	JA	0003	000021	JC
0003 I	000014	K	0003	000007	KA	0003	000017	LB	0003	000020	LE	0003 I	000010	M
0003	000000	MA	0003 I	000004	MC	0003	000002	MCM	0003 I	000015	M1	0003 I	000011	N
0003	000001	NA	0003 I	000005	NC	0003 I	000003	NCM	0006 R	000050	NU	0003 I	000016	N1
0011 R	000000	P	0005 R	000000	PIN	0000 R	000054	PP	0004 R	000004	PR	0000 R	000051	Q2
0004	000021	RANGE	0004 R	000003	RE	0000 R	000061	REVARI	0005 R	000001	RIN	0006 R	000144	S
0004	000022	SMIN	0006	000214	SN	0006 R	000264	ST	0004	000005	STAB	0006	000334	STN
0006	000404	SXI	0006	000454	SXIN	0011 R	011300	T	0004 R	000020	TIME	0005	000002	TIN
0000 R	000060	TT	0004	000036	TW	0007	000000	U	0005	000006	UIN	0007 R	022600	UN
0004 R	000001	U0	0010 R	000007	U1	0010 R	000010	U2	0010 R	000011	U3	0010 R	000012	U4
0005	000007	VIN	0006 R	000000	XI	0004	000035	XIMAX	0012 R	000000	YS	0004	000024	Y0
0012 R	000050	ZS	0012 R	000120	ZSY	0004	000023	Z0						

```
00101      1*            SUBROUTINE OUTPUT
00101      2*      C
00103      3*            PARAMETER NN=60,MM=40,JJ=4
00104      4*            REAL NU
00105      5*            DIMENSION CF(MM)
00106      6*            COMMON/MAIN1/MA,NA,MC,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      7*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNJ,DT,DXI2,D
00107      8*           1              NU2,DXINU,TIME,RANGE,SMIN,ZJ,YJ,EPS(3),ERR(3),HST,ELL
00107      9*           2              ,XIMAX,TW,ANG_E,GE
00110     10*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00111     11*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00111     12*           1             SXIN(MM)
00112     13*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00113     14*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00113     15*           1             H2NU,H3XI,H3NJ,H3XINU,H3XIXI
00114     16*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00115     17*            COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM)
00115     18*      C
00116     19*          100 FORMAT(1H1)
00117     20*          101 FORMAT(1H0,9H AT LINE ,I10/13X,1HP,12X,1HT,12X,3HRHO,12X,1HU,12X,1
00117     21*             1HV,11X,1HE,12X,1HM,13X,1HZ,7X,2HCF,7X,2HCH)
00120     22*          102 FORMAT(I3,8E13.5,2X,2E9.4)
00121     23*          103 FORMAT(1H1,8H AT STEP,I10,15X,4H DT=E16.7,3X,5HAT N=I3,4H, M=I3,4H
00121     24*             1,     /50X,5HTIME=E16.7/1H0)
00122     25*          104 FORMAT(35X,5HY    ,5X,14HSHOCK VELOCITY,9X,2HSY,12X,2HZS,15X,2HYS)
00123     26*          106 FORMAT(I27,5E15.5)
00124     27*          111 FORMAT(1H0,9H AT LINE ,I10/13X,1HP,12X,1HT,12X,3HRHO,12X,1HU,12X,1
00124     28*             1HV,11X,1HE,12X,1HM,13X,1HZ,7X,6HOHSTAG,3X,2HDT)
00124     29*      C
00125     30*            WRITE(6,103)K,DT,N1,M1,TIME
00134     31*            WRITE(6,104)
00136     32*            DO 35 M=2,MC
00141     33*            DUM2=XI(M)
00142     34*           35 WRITE(6,106)M,DUM2,ST(M),ZSY(M),ZS(M),YS(M)
00153     35*            DO 50 N=2,NC
00156     36*            IF(N.NE.NC)WRITE(6,111)N
00162     37*            IF(N.EQ.NC)WRITE(6,101)N
00166     38*            DO 50 M=2,MC
00171     39*            CALL CONVR2(N,M)
00172     40*            Q2=U2*U2+U3*U3
00173     41*            A2=A(N,M)*A(N,M)
00174     42*            DUM=SQRT(Q2/A2)
00175     43*            PP=P(N,M)
00176     44*            HH=U4*PIN/RIN+PP*PIN/U1/RIN
00177     45*            OHSTAG=1.*HH/(HIN*U0**2./2.)
00200     46*            DAM=S(M)*(1.-NU(N))
00201     47*            TT=T(N,M)
00202     48*            REVAR1=RE*(T(N,M)+0.5)/1.5/T(N,M)**1.5
00203     49*            IF(N.EQ.NCM)CF(M)=2./REVAR1/SQRT(GAMMA)/ACH*U2/DNU/S(M)
00205     50*            IF(N.EQ.NC)CH=GA/PR/REVAR1/((HIN+U0**2./2.-HH)/PIN*RIN)*(T(NC,M)
00205     51*           1    -T(NC,M))/DNU/S(M)
00207     52*            DT=AMIN1(DXI/(ABS(UN(N,M,2)/UN(N,M,1)))*A(N,M)),
00207     53*           1                DNU*S(M)/(ABS(UN(N,M,3)/UN(N,M,1)))*A(N,M)))
00210     54*            DT=DT/3.
00211     55*            IF(N.NE.NC)WRITE(6,102)M,PP,TT,U1,U2,U3,U4,DUM,DAM,OHSTAG,DT
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00227     56*            IF(N.EG.NC)WRITE(6,102)M,PR,TT,U1,U2,U3,U4,DUM,DAM,CF(M),CH
00245     57*         50 CONTINUE
00245     58*      C
00250     59*            RETURN
00251     60*            END

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
@ FOR,* CONVR1,CONVR1                                          25 JUN 72          5117149.575
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  *(EXEC8 LEVEL E12U1001CA)
THIS COMPILATION WAS DONE ON 25 JUN 72 AT 05117149

*20,26

*27,30

      DO 6 M=2,MC

  6   S(M)=0.6+(M-2)/2./MC

      S(1)=S(3)

      CALL REGION

*31,41

*44,44

      DO 3 N=2,NC


   SUBROUTINE CONVR1    ENTRY POINT 000232


   STORAGE USED: CODE(1) 000250; DATA(0) 000446; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   MAIN1  000022
    0004   MAIN2  000041
    0005   MAIN3  000010
    0006   DIFF1  045400
    0007   MAIN5  000524
    0010   BODY1  000240
    0011   REGIN1 016040
    0012   THERM1 016040


   EXTERNAL REFERENCES (BLOCK, NAME)

    0013   REGION
    0014   SQRT
    0015   COS
    0016   SIN
    0017   NERR3$


   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000007 120G      0001   000072 127G      0001   000111 132G      0001   000147 147G      0001   000151 152G
    0001   000152 155G      0001   000172 166G      0012 R 004540 A         0004 R 000000 ACH       0005   000005 AIN
    0004   000037 ANGLE     0010   000170 CURV      0004   000013 DNU       0004   000016 DNU2      0004   000014 DT
    0004 R 000012 DXI       0004   000017 DXINJ     0004   000015 DXI2      0005   040640 E         0005 R 000003 EIN
    0004   000034 ELL       0004   000025 EPS       0004   000030 ERR       0004   000006 GA        0004 R 000002 GAMMA
    0004   000007 GB        0004   000010 GC        0004   000011 GD        0004   000040 GE        0011   000000 HH1
    0011   004540 HH2       0011   011300 HH3       0005   000004 HIN       0004   000033 HST       0003   000012 I
```

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0000	000007	INJPS	0003	I	000013	J	0003	000006	JA	0003	000021	JC	0003	000014	K
0003	000007	KA	0003		000017	LB	0003	000020	LE	0003	I	000010	M	0003	000000	MA
0003	I	000004	MC	0003	I	000002	MCM	0003	000015	M1	0003	I	000011	N	0003	000001	NA
0003	I	000005	NC	0003		000003	NCM	0003	R	000050	NU	0003		000016	N1	0012	R	000000	P
0010	R	000120	PHI	0005	R	000000	PIN	0004		000004	PR	0006	R	000000	Q	0006		022600	R
0004		000021	RANGE	0004		000003	RE	0005	R	000001	RIN	0007	R	000144	S	0004		000022	SMIN
0007		000214	SN	0007		000264	ST	0004		000005	STAB	0007		000334	STN	0007	R	000404	SXI
0007		000454	SXIN	0012	R	011300	T	0004		000020	TIME	0005		000002	TIN	0004		000036	TW
0006		027340	U	0005		000006	UIN	0006	R	022600	UN	0004		000001	U0	0006		034100	V
0005		000007	VIN	0007		000000	XI	0004		000035	XIMAX	0010		000000	YB	0004		000024	YO
0010		000050	ZB	0004		000023	ZO												

```
00101      1*            SUBROUTINE CONVR1
00101      2*      C
00103      3*            PARAMETER MM=40,NN=60,JJ=4
00104      4*            REAL NU
00105      5*            DIMENSION R(NN,MM),U(NN,MM),V(NN,MM),E(NN,MM)
00106      6*            COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,M,N,I,J,K,M1,N1,LB,LE,JC
00107      7*            COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,DXI,DNU,DT,DXI2,D
00107      8*           1              NU2,DXINU,TIME,RANGE,SMIN,Z0,Y0,EPS(3),ERR(3),HST,ELL
00107      9*           2              ,XIMAX,TW,ANGLE,GE
00110     10*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN,UIN,VIN
00111     11*            COMMON/DIFF1/Q(NN,MM,JJ),UN(NN,MM,JJ)
00112     12*            COMMON/MAIN5/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM),
00112     13*           1             SXIN(MM)
00113     14*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM)
00114     15*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00115     16*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00116     17*            EQUIVALENCE (UN(1,1,1),R(1,1)),(UN(1,1,2),U(1,1)),(UN(1,1,3),V(
00116     18*           1             1,1)),(UN(1,1,4),E(1,1))
00116     19*      C
00117     20*            DO 6 M=2,MC                                                    *NEW
00122     21*        6   S(M)=0.6*(M-2)/2./MC                                           *NEW
00124     22*            S(1)=S(3)                                                      *NEW
00125     23*            CALL REGION                                                    *NEW
00125     24*      C                                                                    *-22
00126     25*            DO 3 M=1,MC
00131     26*            DO 3 N=2,NC                                                    *NEW
00134     27*            P(N,M)=1.                                                      *-1
00135     28*            A(N,M)=SQRT(GAMMA)
00136     29*            T(N,M)=1.
00137     30*            Q(N,M,1)=1.
00140     31*            Q(N,M,2)=Q(N,M,1)*SQRT(GAMMA)*ACH*COS(PHI(M))
00141     32*            Q(N,M,3)=-Q(N,M,1)*SQRT(GAMMA)*ACH*SIN(PHI(M))
00142     33*            Q(N,M,4)=Q(N,M,1)*(EIN/PIN*RIN+0.5*GAMMA*ACH**2.)
00143     34*        3   CONTINUE
00143     35*      C
00146     36*            DO 2 J=1,JJ
00151     37*            DO 2 M=1,MC
00154     38*            DO 2 N=2,NC
00157     39*            Q(N,M,J)=Q(N,M,J)*S(M)
00160     40*            UN(N,M,J)=Q(N,M,J)
00161     41*        2   CONTINUE
00161     42*      C
00165     43*            DO 5 M=3,MCM
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0C170      44*          5   SXI(M)=(S(M+1)-S(M-1))/2./DXI
0C172      45*              SXI(MC)=2.*SXI(MCM)-SXI(MCM-1)
0C173      46*              SXI(1)=-SXI(3)
0C174      47*              SXI(2)=0.
0C174      48*      C
0C175      49*              RETURN
0C176      50*              END
0C176      51*      C

   END OF COMPILATION:        NO  DIAGNOSTICS.
CONVR1           SYMBOLIC
CONVR1  CODE     RELOCATABLE
```

25 JUN 72	05:17:32	0	01454403	14	69	(DELETED)
25 JUN 72	05:17:32	1	01457121	51	1	(DELETED)
		0	01456311	14	28	

```
* xQT CUR                                                    25 JUN 72          5117151. 63
                                                                               5117151.244
    1.  DEL GAMAR/CODE
    GAMAR    CODE     RELOCATABLE

                                                                                          (DELETED)
25 JUN 72  05117146   1  01501616     17      1
                      0  01501402     14     10

    END CUR LCC 1102-0039 L9
```

VISCOUS SHOCK LAYER SOLUTION AT ZERO FLOW INCIDENCE
PROGRAM G130

FLOWFIELD CALCULATION FOR ORBITER NOSE OF 5 FT AT TRAJECTORY POINT 5

RUN NUMBER 20 ON 6/13/72
LB= 1 LE= 1

MA= 15 NA= 20 KA= 600 JA= 50

GAMMA= .1400000+01 STAB= .5000000+00

RE= .10000+02 PR= .71000+00 TW= .80000+01

Z0= .0000 Y0= .0000 XIMAX= .1000+01 ANGLE= .00000

L0=.,2500+05 PIN=.4450-04 HIN=,4180+07 RIN=,3726-10 TIN=,6958+03 EIN=,2986+07 ACH=,1933+02

EPS 1 TO 7
.100000-02 .100000-02 .000000

* DIVIDE CHECK AT 026777

M=	XI=	ZB=	YB=	ZBY=	CURV=
2	.0000	1.000	.00000	.00000	1.000
3	.0769	.997	.07692	-.07715	1.000
4	.1538	.988	.15362	-.15546	1.000
5	.2308	.973	.22963	-.23593	1.000
6	.3077	.953	.30450	-.31968	1.000
7	.3846	.926	.37777	-.40800	1.000
8	.4615	.894	.44899	-.50249	1.000
9	.5385	.856	.51772	-.60514	1.000
10	.6154	.812	.58353	-.71856	1.000
11	.6923	.763	.64600	-.84629	1.000
12	.7692	.709	.70472	-.99329	1.000
13	.8462	.651	.75930	-1.16681	1.000
14	.9231	.587	.80935	-1.37805	1.000
15	1.0000	.519	.85453	-1.64524	1.000

AT STEP 0 DT= .0000000 AT N= 0, M= 0,
TIME= .0000000

	Y	SHOCK VELOCITY	SY	ZS	YS
2	.00000	.00000	.00000	.00000	.00000
3	.76923-01	.00000	.00000	.00000	.00000
4	.15385+00	.00000	.00000	.00000	.00000
5	.23077+00	.00000	.00000	.00000	.00000
6	.30769+00	.00000	.00000	.00000	.00000
7	.38462+00	.00000	.00000	.00000	.00000
8	.46154+00	.00000	.00000	.00000	.00000
9	.53846+00	.00000	.00000	.00000	.00000
10	.61538+00	.00000	.00000	.00000	.00000
11	.69231+00	.00000	.00000	.00000	.00000
12	.76923+00	.00000	.00000	.00000	.00000
13	.84615+00	.00000	.00000	.00000	.00000
14	.92308+00	.00000	.00000	.00000	.00000
15	.10000+01	.00000	.00000	.00000	.00000

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.60000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.63333+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.66667+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.70000+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.73333+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.76667+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.80000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.83333+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.86667+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.90000+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.93333+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.96667+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.10000+01	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.10333+01	.5960-07	.1237-02

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.57000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.60167+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.63333+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.66500+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.69667+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.72833+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.76000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.79167+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.82333+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.85500+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.88667+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.91833+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.95000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.98167+00	.5960-07	.1237-02

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.54000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.57000+00	.5960-07	.4400-03

	P	T	RHO	U	V	E	W	Z	D=S*AG	DT
4	.10000D+01	.10000D+01	.10000D+01	.35141D-01	-.22605D+02	.26416D+03	.19334D+02	.60000D+00	.5960D-07	.4671D-03
5	.10000D+01	.10000D+01	.10000D+01	.52530D-01	-.22265D+02	.26416D+03	.19334D+02	.63333D+00	.5960D-07	.4975D-03
6	.10000D+01	.10000D+01	.10000D+01	.59657D-01	-.21790D+02	.26416D+03	.19334D+02	.66000D+00	.5960D-07	.5320D-03
7	.10000D+01	.10000D+01	.10000D+01	.86418D-01	-.21181D+02	.26416D+03	.19334D+02	.69000D+00	.5960D-07	.5713D-03
8	.10000D+01	.10000D+01	.10000D+01	.10271D-02	-.20441D+02	.26416D+03	.19334D+02	.72000D+00	.5960D-07	.6166D-03
9	.10000D+01	.10000D+01	.10000D+01	.11844D-02	-.19572D+02	.26416D+03	.19334D+02	.75000D+00	.5960D-07	.6692D-03
10	.10000D+01	.10000D+01	.10000D+01	.13349D-02	-.18578D+02	.26416D+03	.19334D+02	.78000D+00	.5960D-07	.7310D-03
11	.10000D+01	.10000D+01	.10000D+01	.14778D-02	-.17462D+02	.26416D+03	.19334D+02	.81000D+00	.5960D-07	.8045D-03
12	.10000D+01	.10000D+01	.10000D+01	.16121D-02	-.16230D+02	.26416D+03	.19334D+02	.84000D+00	.5960D-07	.8933D-03
13	.10000D+01	.10000D+01	.10000D+01	.17370D-02	-.14887D+02	.26416D+03	.19334D+02	.87000D+00	.5960D-07	.1003D-02
14	.10000D+01	.10000D+01	.10000D+01	.18515D-02	-.13436D+02	.26416D+03	.19334D+02	.90000D+00	.2980D-07	.1140D-02
15	.10000D+01	.10000D+01	.10000D+01	.19549D-02	-.11882D+02	.26416D+03	.19334D+02	.93000D+00	.5960D-07	.1239D-02

AT LINE 5

	P	T	RHO	U	V	E	W	Z	D=S*AG	DT
2	.10000D+01	.10000D+01	.10000D+01	.84176D-04	-.22876D+02	.26416D+03	.19334D+02	.51000D+00	.5960D-07	.4156D-03
3	.10000D+01	.10000D+01	.10000D+01	.17596D-01	-.22809D+02	.26416D+03	.19334D+02	.53833D+00	.5960D-07	.4400D-03
4	.10000D+01	.10000D+01	.10000D+01	.35141D-01	-.22605D+02	.26416D+03	.19334D+02	.56667D+00	.5960D-07	.4671D-03
5	.10000D+01	.10000D+01	.10000D+01	.52530D-01	-.22265D+02	.26416D+03	.19334D+02	.59500D+00	.5960D-07	.4975D-03
6	.10000D+01	.10000D+01	.10000D+01	.59657D-01	-.21790D+02	.26416D+03	.19334D+02	.62333D+00	.5960D-07	.5320D-03
7	.10000D+01	.10000D+01	.10000D+01	.86418D-01	-.21181D+02	.26416D+03	.19334D+02	.65167D+00	.5960D-07	.5713D-03
8	.10000D+01	.10000D+01	.10000D+01	.10271D-02	-.20441D+02	.26416D+03	.19334D+02	.68000D+00	.5960D-07	.6166D-03
9	.10000D+01	.10000D+01	.10000D+01	.11844D-02	-.19572D+02	.26416D+03	.19334D+02	.70833D+00	.5960D-07	.6692D-03
10	.10000D+01	.10000D+01	.10000D+01	.13349D-02	-.18578D+02	.26416D+03	.19334D+02	.73667D+00	.5960D-07	.7310D-03
11	.10000D+01	.10000D+01	.10000D+01	.14778D-02	-.17462D+02	.26416D+03	.19334D+02	.76500D+00	.5960D-07	.8045D-03
12	.10000D+01	.10000D+01	.10000D+01	.16121D-02	-.16230D+02	.26416D+03	.19334D+02	.79333D+00	.5960D-07	.8933D-03
13	.10000D+01	.10000D+01	.10000D+01	.17370D-02	-.14887D+02	.26416D+03	.19334D+02	.82167D+00	.5960D-07	.1003D-02
14	.10000D+01	.10000D+01	.10000D+01	.18515D-02	-.13436D+02	.26416D+03	.19334D+02	.85000D+00	.2980D-07	.1140D-02
15	.10000D+01	.10000D+01	.10000D+01	.19549D-02	-.11882D+02	.26416D+03	.19334D+02	.87833D+00	.5960D-07	.1239D-02

AT LINE 6

	P	T	RHO	U	V	E	W	Z	D=S*AG	DT
2	.10000D+01	.10000D+01	.10000D+01	.84176D-04	-.22876D+02	.26416D+03	.19334D+02	.48000D+00	.5960D-07	.4156D-03
3	.10000D+01	.10000D+01	.10000D+01	.17596D-01	-.22809D+02	.26416D+03	.19334D+02	.50667D+00	.5960D-07	.4400D-03
4	.10000D+01	.10000D+01	.10000D+01	.35141D-01	-.22605D+02	.26416D+03	.19334D+02	.53333D+00	.5960D-07	.4671D-03
5	.10000D+01	.10000D+01	.10000D+01	.52530D-01	-.22265D+02	.26416D+03	.19334D+02	.56000D+00	.5960D-07	.4975D-03
6	.10000D+01	.10000D+01	.10000D+01	.59657D-01	-.21790D+02	.26416D+03	.19334D+02	.58667D+00	.5960D-07	.5320D-03
7	.10000D+01	.10000D+01	.10000D+01	.86418D-01	-.21181D+02	.26416D+03	.19334D+02	.61333D+00	.5960D-07	.5713D-03
8	.10000D+01	.10000D+01	.10000D+01	.10271D-02	-.20441D+02	.26416D+03	.19334D+02	.64000D+00	.5960D-07	.6166D-03
9	.10000D+01	.10000D+01	.10000D+01	.11844D-02	-.19572D+02	.26416D+03	.19334D+02	.66667D+00	.5960D-07	.6692D-03
10	.10000D+01	.10000D+01	.10000D+01	.13349D-02	-.18578D+02	.26416D+03	.19334D+02	.69333D+00	.5960D-07	.7310D-03
11	.10000D+01	.10000D+01	.10000D+01	.14778D-02	-.17462D+02	.26416D+03	.19334D+02	.72000D+00	.5960D-07	.8045D-03
12	.10000D+01	.10000D+01	.10000D+01	.16121D-02	-.16230D+02	.26416D+03	.19334D+02	.74667D+00	.5960D-07	.8933D-03
13	.10000D+01	.10000D+01	.10000D+01	.17370D-02	-.14887D+02	.26416D+03	.19334D+02	.77333D+00	.5960D-07	.1003D-02
14	.10000D+01	.10000D+01	.10000D+01	.18515D-02	-.13436D+02	.26416D+03	.19334D+02	.80000D+00	.2980D-07	.1140D-02
15	.10000D+01	.10000D+01	.10000D+01	.19549D-02	-.11882D+02	.26416D+03	.19334D+02	.82667D+00	.5960D-07	.1239D-02

AT LINE 7

	P	T	RHO	U	V	E	W	Z	D=S*AG	DT
2	.10000D+01	.10000D+01	.10000D+01	.84176D-04	-.22876D+02	.26416D+03	.19334D+02	.45000D+00	.5960D-07	.4156D-03
3	.10000D+01	.10000D+01	.10000D+01	.17596D-01	-.22809D+02	.26416D+03	.19334D+02	.47500D+00	.5960D-07	.4400D-03
4	.10000D+01	.10000D+01	.10000D+01	.35141D-01	-.22605D+02	.26416D+03	.19334D+02	.50000D+00	.5960D-07	.4671D-03
5	.10000D+01	.10000D+01	.10000D+01	.52530D-01	-.22265D+02	.26416D+03	.19334D+02	.52500D+00	.5960D-07	.4975D-03
6	.10000D+01	.10000D+01	.10000D+01	.59657D-01	-.21790D+02	.26416D+03	.19334D+02	.55000D+00	.5960D-07	.5320D-03
7	.10000D+01	.10000D+01	.10000D+01	.86418D-01	-.21181D+02	.26416D+03	.19334D+02	.57500D+00	.5960D-07	.5713D-03
8	.10000D+01	.10000D+01	.10000D+01	.10271D-02	-.20441D+02	.26416D+03	.19334D+02	.60000D+00	.5960D-07	.6166D-03
9	.10000D+01	.10000D+01	.10000D+01	.11844D-02	-.19572D+02	.26416D+03	.19334D+02	.62500D+00	.5960D-07	.6692D-03
10	.10000D+01	.10000D+01	.10000D+01	.13349D-02	-.18578D+02	.26416D+03	.19334D+02	.65000D+00	.5960D-07	.7310D-03

11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.67500+00	.5960-07	.5045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.70000+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.72500+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.75000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.77500+00	.5960-07	.1237-02

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.42000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.44333+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.46667+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.49000+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.51333+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.53667+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.56000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.58333+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.60667+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.63000+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.65333+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.67667+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.70000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.72333+00	.5960-07	.1237-02

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.39000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.41167+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.43333+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.45500+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.47667+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.49833+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.52000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.54167+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.56333+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.58500+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.60667+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.62833+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.65000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.67167+00	.5960-07	.1237-02

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.36000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.38000+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.40000+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.42000+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.44000+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.46000+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.48000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.50000+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.52000+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.54000+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.56000+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.58000+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.60000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.62000+00	.5960-07	.1237-02

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	=.84176-04	-.22876+02	.26416+03	.19334+02	.33000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.34833+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.36667+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.38500+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.40333+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.42167+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.44000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.45833+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.47667+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14779+02	-.17462+02	.26416+03	.19334+02	.49500+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.51333+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.53167+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.55000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.56833+00	.5960-07	.1237-02

AT LINE 12

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	=.84176-04	-.22876+02	.26416+03	.19334+02	.30000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.31667+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.33333+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.35000+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.36667+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.38333+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.40000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.41667+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.43333+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.45000+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.46667+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.48333+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.50000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.51667+00	.5960-07	.1237-02

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	=.84176-04	-.22876+02	.26416+03	.19334+02	.27000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.28500+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.30000+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.31500+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.33000+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.34500+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.36000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.37500+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.39000+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.40500+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.42000+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.43500+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.45000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.46500+00	.5960-07	.1237-02

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	=.84176-04	-.22876+02	.26416+03	.19334+02	.24000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.25333+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.26667+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.28000+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.29333+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.30667+00	.5960-07	.5713-03

8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.32000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.33333+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.34667+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.36000+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.37333+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.38667+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.40000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.41333+00	.5960-07	.1237-02

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.21000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.22167+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.23333+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.24500+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.25667+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.26833+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.28000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.29167+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.30333+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.31500+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.32667+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.33833+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.35000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.36167+00	.5960-07	.1237-02

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.18000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.19000+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.20000+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.21000+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.22000+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.23000+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.24000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.25000+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.26000+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.27000+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.28000+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.29000+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.30000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.31000+00	.5960-07	.1237-02

AT LINE 17

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.15000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.15833+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.16667+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.17500+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.18333+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.19167+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.20000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.20833+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.21667+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.22500+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.23333+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.24167+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.25000+00	.2980-07	.1140-02

15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.25833+00	.5960-07	.1237-02

AT LINE 18

	P	T	RHO	U	V	E	M	Z	D-STAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.12000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.12667+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.13333+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.14000+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.14667+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.15333+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.16000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.16667+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.17333+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.18000+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.18667+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.19333+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.20000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.20667+00	.5960-07	.1237-02

AT LINE 19

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.90000-01	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.95000-01	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.10000+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.10500+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.11000+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.11500+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.12000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.12500+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.13000+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.13500+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.14000+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.14500+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.15000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.15500+00	.5960-07	.1237-02

AT LINE 20

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.60000-01	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.63333-01	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.66667-01	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.70000-01	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.73333-01	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.76667-01	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.80000-01	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.83333-01	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.86667-01	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.90000-01	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.93333-01	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.96667-01	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.10000+00	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.10333+00	.5960-07	.1237-02

AT LINE 21

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	-.84176-04	-.22876+02	.26416+03	.19334+02	.30000-01	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.31667-01	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.33333-01	.5960-07	.4671-03

	P	T	RHO	U	V	E	M	Z	CF	CH
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.35000-01	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.59657+01	-.21790+02	.26416+03	.19334+02	.36667-01	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.38333-01	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.40000-01	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.41667-01	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.43333-01	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.45000-01	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.46667-01	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.48333-01	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.50000-01	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.51667-01	.5960-07	.1237-02

AT LINE 22

	P	T	RHO	U	V	E	M	Z	CF	CH
2	.10000+01	.10000+01	.10000+01	.84176-04	-.22876+02	.26416+03	.19334+02	.89407-08	-.2453-04	.0000
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.94374-08	.4858+00	.0000
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.99341-08	.9217+00	.0000
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.10431-07	.1312+01	.0000
6	.10000+01	.10000+01	.10000+01	.59657+01	-.21790+02	.26416+03	.19334+02	.10928-07	.1661+01	.0000
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.11424-07	.1971+01	.0000
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.11921-07	.2245+01	.0000
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.12418-07	.2485+01	.0000
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.12914-07	.2693+01	.0000
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.13411-07	.2871+01	.0000
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.13908-07	.3020+01	.0000
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.14404-07	.3142+01	.0000
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.14901-07	.3237+01	.0000
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.15398-07	.3308+01	.0000

STEP 0, TIME= .4918-04, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .1000+01

* DIVIDE CHECK AT 024530

* DIVIDE CHECK AT 024552

* DIVIDE CHECK AT 024572

* DIVIDE CHECK AT 024604

* DIVIDE CHECK AT 024667

* DIVIDE CHECK AT 024707

* DIVIDE CHECK AT 024710

* DIVIDE CHECK AT 024530

* DIVIDE CHECK AT 024552

STEP 1, TIME= .5350-04, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .8057+01

STEP 2, TIME= .5780-04, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .8121+01

STEP 3, TIME= .6210-04, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .8190+01

AT STEP 600 DT= .3421030-04 AT N= 15, M= 2,
TIME= .3698591-02

	Y	SHOCK VELOCITY	SY	ZS	YS
2	.00000	.00000	.00000	.00000	.00000
3	.76923-01	.00000	.00000	.00000	.00000
4	.15385+00	.00000	.00000	.00000	.00000
5	.23077+00	.00000	.00000	.00000	.00000
6	.30769+00	.00000	.00000	.00000	.00000
7	.38462+00	.00000	.00000	.00000	.00000
8	.46154+00	.00000	.00000	.00000	.00000
9	.53846+00	.00000	.00000	.00000	.00000
10	.61538+00	.00000	.00000	.00000	.00000
11	.69231+00	.00000	.00000	.00000	.00000
12	.76923+00	.00000	.00000	.00000	.00000
13	.84615+00	.00000	.00000	.00000	.00000
14	.92308+00	.00000	.00000	.00000	.00000
15	.10000+01	.00000	.00000	.00000	.00000

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.10000+01	.10000+01	.10000+01	.00000	-.22876+02	.26416+03	.19334+02	.60000+00	.5960-07	.4156-03
3	.10000+01	.10000+01	.10000+01	.17596+01	-.22809+02	.26416+03	.19334+02	.63333+00	.5960-07	.4400-03
4	.10000+01	.10000+01	.10000+01	.35141+01	-.22605+02	.26416+03	.19334+02	.66667+00	.5960-07	.4671-03
5	.10000+01	.10000+01	.10000+01	.52530+01	-.22265+02	.26416+03	.19334+02	.70000+00	.5960-07	.4975-03
6	.10000+01	.10000+01	.10000+01	.69657+01	-.21790+02	.26416+03	.19334+02	.73333+00	.5960-07	.5320-03
7	.10000+01	.10000+01	.10000+01	.86418+01	-.21181+02	.26416+03	.19334+02	.76667+00	.5960-07	.5713-03
8	.10000+01	.10000+01	.10000+01	.10271+02	-.20441+02	.26416+03	.19334+02	.80000+00	.5960-07	.6166-03
9	.10000+01	.10000+01	.10000+01	.11844+02	-.19572+02	.26416+03	.19334+02	.83333+00	.5960-07	.6692-03
10	.10000+01	.10000+01	.10000+01	.13349+02	-.18578+02	.26416+03	.19334+02	.86667+00	.5960-07	.7310-03
11	.10000+01	.10000+01	.10000+01	.14778+02	-.17462+02	.26416+03	.19334+02	.90000+00	.5960-07	.8045-03
12	.10000+01	.10000+01	.10000+01	.16121+02	-.16230+02	.26416+03	.19334+02	.93333+00	.5960-07	.8933-03
13	.10000+01	.10000+01	.10000+01	.17370+02	-.14887+02	.26416+03	.19334+02	.96667+00	.5960-07	.1003-02
14	.10000+01	.10000+01	.10000+01	.18515+02	-.13436+02	.26416+03	.19334+02	.10000+01	.2980-07	.1140-02
15	.10000+01	.10000+01	.10000+01	.19549+02	-.11882+02	.26416+03	.19334+02	.10333+01	.5960-07	.1237-02

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.12802+02	.12043+02	.10630+01	.00000	-.20293+02	.23602+03	.49422+01	.57000+00	.6450-01	.4098-03
3	.11399+02	.10762+02	.10592+01	.15414+01	-.20546+02	.23916+03	.53080+01	.60167+00	.5746-01	.4321-03
4	.95240+01	.90979+01	.10468+01	.33403+01	-.20621+02	.24094+03	.58533+01	.63333+00	.5705-01	.4593-03
5	.88851+01	.84997+01	.10453+01	.49480+01	-.20495+02	.24352+03	.61121+01	.66500+00	.4956-01	.4872-03
6	.81141+01	.77934+01	.10411+01	.66509+01	-.20154+02	.24468+03	.64250+01	.69667+00	.4784-01	.5211-03
7	.76187+01	.73260+01	.10400+01	.82717+01	-.19688+02	.24633+03	.66681+01	.72833+00	.4340-01	.5582-03
8	.70759+01	.68195+01	.10376+01	.98797+01	-.19060+02	.24749+03	.69479+01	.76000+00	.4092-01	.6020-03
9	.65963+01	.63654+01	.10363+01	.11424+02	-.18314+02	.24887+03	.72306+01	.79167+00	.3745-01	.6521-03
10	.61152+01	.59108+01	.10346+01	.12911+02	-.17435+02	.25012+03	.75418+01	.82333+00	.3445-01	.7111-03
11	.55810+01	.54041+01	.10327+01	.14329+02	-.16449+02	.25145+03	.79310+01	.85500+00	.3132-01	.7813-03
12	.50883+01	.49345+01	.10312+01	.15665+02	-.15353+02	.25289+03	.83451+01	.88667+00	.2768-01	.8651-03
13	.43599+01	.42423+01	.10277+01	.16927+02	-.14180+02	.25440+03	.90607+01	.91833+00	.2460-01	.9696-03
14	.37429+01	.36610+01	.10224+01	.18101+02	-.12926+02	.25652+03	.98248+01	.95000+00	.1878-01	.1097-02
15	.20625+01	.20273+01	.10174+01	.19211+02	-.11742+02	.25853+03	.13364+02	.98167+00	.1738-01	.1227-02

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.95447+01	.88591+01	.10774+01	.00000	-.20651+02	.23539+03	.58640+01	.54000+00	.7887-01	.4137-03
3	.90126+01	.83386+01	.10808+01	.16913+01	-.20738+02	.23731+03	.60897+01	.57000+00	.7360-01	.4370-03

4	.82885+01	.77102+01	.10750+01	.33323+01	-.20752+02	.24015+03	.63972+01	.60000+00	.6526-01	.4622-03
5	.78651+01	.73324+01	.10726+01	.49895+01	-.20504+02	.24099+03	.65864+01	.63000+00	.6352-01	.4921-03
6	.75743+01	.70833+01	.10693+01	.66155+01	-.20139+02	.24239+03	.67315+01	.66000+00	.5918-01	.5248-03
7	.73291+01	.67737+01	.10672+01	.82181+01	-.19610+02	.24298+03	.69045+01	.69000+00	.5813-01	.5632-03
8	.69621+01	.65389+01	.10647+01	.97769+01	-.18967+02	.24401+03	.70525+01	.72000+00	.5512-01	.6063-03
9	.66264+01	.62344+01	.10629+01	.11287+02	-.18184+02	.24461+03	.72442+01	.75000+00	.5401-01	.6571-03
10	.63373+01	.59742+01	.10608+01	.12735+02	-.17290+02	.24549+03	.74251+01	.78000+00	.5165-01	.7157-03
11	.59573+01	.56264+01	.10588+01	.14114+02	-.16275+02	.24612+03	.76759+01	.81000+00	.5061-01	.7861-03
12	.56205+01	.53202+01	.10565+01	.15414+02	-.15160+02	.24702+03	.79219+01	.84000+00	.4837-01	.8696-03
13	.50612+01	.48041+01	.10535+01	.16632+02	-.13955+02	.24770+03	.83718+01	.87000+00	.4774-01	.9736-03
14	.46206+01	.44090+01	.10480+01	.17758+02	-.12668+02	.24893+03	.87799+01	.90000+00	.4458-01	.1100-02
15	.30884+01	.29616+01	.10428+01	.18821+02	-.11453+02	.25010+03	.10820+02	.93000+00	.4564-01	.1229-02

AT LINE 5

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.17666+02	.16132+02	.10951+01	.00000	-.18930+02	.21949+03	.39833+01	.51000+00	.1114+00	.4223-03
3	.16501+02	.14943+02	.11042+01	.14389+01	-.19232+02	.22333+03	.42165+01	.53833+00	.1014+00	.4434-03
4	.14514+02	.13266+02	.10941+01	.32408+01	-.19330+02	.22523+03	.45479+01	.56667+00	.1006+00	.4700-03
5	.13877+02	.12680+02	.10944+01	.47552+01	-.19273+02	.22873+03	.47115+01	.59500+00	.8957-01	.4967-03
6	.12896+02	.11821+02	.10909+01	.64253+01	-.18976+02	.23023+03	.49246+01	.62333+00	.8716-01	.5304-03
7	.12302+02	.11291+02	.10896+01	.79858+01	-.18568+02	.23249+03	.50838+01	.65167+00	.8063-01	.5668-03
8	.11562+02	.10641+02	.10865+01	.95545+01	-.17990+02	.23407+03	.52776+01	.68000+00	.7714-01	.6102-03
9	.10920+02	.10071+02	.10843+01	.11054+02	-.17303+02	.23597+03	.54682+01	.70833+00	.7213-01	.6596-03
10	.10236+02	.94661+01	.10814+01	.12502+02	-.16487+02	.23772+03	.56837+01	.73667+00	.6778-01	.7177-03
11	.94714+01	.87868+01	.10779+01	.13884+02	-.15570+02	.23956+03	.59479+01	.76500+00	.6340-01	.7863-03
12	.87522+01	.81443+01	.10746+01	.15189+02	-.14555+02	.24164+03	.62301+01	.79333+00	.5800-01	.8675-03
13	.77064+01	.72078+01	.10692+01	.16424+02	-.13474+02	.24367+03	.66875+01	.82167+00	.5389-01	.9676-03
14	.68057+01	.64212+01	.10599+01	.17577+02	-.12327+02	.24651+03	.71604+01	.85000+00	.4613-01	.1088-02
15	.49310+01	.46909+01	.10512+01	.18674+02	-.11236+02	.24922+03	.85044+01	.87833+00	.4244-01	.1207-02

AT LINE 6

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.15175+02	.14173+02	.10707+01	.00000	-.18827+02	.21265+03	.42264+01	.48000+00	.1446+00	.4295-03
3	.14711+02	.13466+02	.10924+01	.15776+01	-.18999+02	.21540+03	.43909+01	.50667+00	.1369+00	.4522-03
4	.13908+02	.12698+02	.10953+01	.31452+01	-.19159+02	.22023+03	.46050+01	.53333+00	.1216+00	.4753-03
5	.13304+02	.12102+02	.10993+01	.47203+01	-.18972+02	.22137+03	.47496+01	.56000+00	.1195+00	.5053-03
6	.12909+02	.11724+02	.11010+01	.62735+01	-.18700+02	.22384+03	.48686+01	.58667+00	.1116+00	.5372-03
7	.12375+02	.11221+02	.11029+01	.78059+01	-.18236+02	.22480+03	.50048+01	.61333+00	.1099+00	.5756-03
8	.11962+02	.10846+02	.11029+01	.92997+01	-.17675+02	.22656+03	.51254+01	.64000+00	.1047+00	.6181-03
9	.11408+02	.10340+02	.11033+01	.10749+02	-.16967+02	.22756+03	.52789+01	.66667+00	.1028+00	.6687-03
10	.10925+02	.99135+01	.11020+01	.12141+02	-.16159+02	.22905+03	.54254+01	.69333+00	.9880-01	.7264-03
11	.10268+02	.93270+01	.11009+01	.13470+02	-.15234+02	.23007+03	.56274+01	.72000+00	.9716-01	.7959-03
12	.96848+01	.88175+01	.10984+01	.14724+02	-.14221+02	.23155+03	.58262+01	.74667+00	.9349-01	.8771-03
13	.87539+01	.79889+01	.10958+01	.15904+02	-.13132+02	.23267+03	.61672+01	.77333+00	.9242-01	.9778-03
14	.79576+01	.73135+01	.10881+01	.17000+02	-.11978+02	.23452+03	.64992+01	.80000+00	.8797-01	.1098-02
15	.62008+01	.57369+01	.10809+01	.18040+02	-.10883+02	.23628+03	.74342+01	.82667+00	.8728-01	.1228-02

AT LINE 7

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.20875+02	.19416+02	.10751+01	.00000	-.17615+02	.20369+03	.33786+01	.45000+00	.1586+00	.4380-03
3	.20164+02	.18418+02	.10948+01	.13548+01	-.17938+02	.20785+03	.35426+01	.47500+00	.1467+00	.4586-03
4	.18335+02	.16846+02	.10884+01	.31121+01	-.18045+02	.20977+03	.37706+01	.50000+00	.1454+00	.4852-03
5	.17828+02	.16321+02	.10924+01	.45481+01	-.18038+02	.21382+03	.38916+01	.52500+00	.1321+00	.5113-03
6	.16841+02	.15399+02	.10937+01	.61637+01	-.17780+02	.21555+03	.40528+01	.55000+00	.1290+00	.5451-03
7	.16262+02	.14840+02	.10958+01	.76599+01	-.17422+02	.21821+03	.41754+01	.57500+00	.1211+00	.5813-03
8	.15458+02	.14101+02	.10962+01	.91746+01	-.16895+02	.22006+03	.43269+01	.60000+00	.1169+00	.6249-03
9	.14754+02	.13450+02	.10970+01	.10619+02	-.16265+02	.22228+03	.44763+01	.62500+00	.1110+00	.6741-03
10	.13962+02	.12738+02	.10960+01	.12018+02	-.15511+02	.22435+03	.46464+01	.65000+00	.1059+00	.7320-03

11	.15067+02	.11931+02	.10952+01	.13353+02	-.14563+02	.22647+03	.48523+01	.67500+00	.1309+00	.8000-03
12	.12188+02	.11159+02	.10922+01	.14614+02	-.13727+02	.22889+03	.50726+01	.70000+00	.9470-01	.8799-03
13	.10959+02	.10056+02	.10898+01	.15810+02	-.12732+02	.23116+03	.54100+01	.72500+00	.9029-01	.9774-03
14	.98385+01	.91001+01	.10811+01	.16927+02	-.11683+02	.23425+03	.57622+01	.75000+00	.8224-01	.1093-02
15	.78567+01	.73217+01	.10731+01	.17989+02	-.10686+02	.23719+03	.65351+01	.77500+00	.7788-01	.1210-02

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.19251+02	.18125+02	.10621+01	.00000	-.17115+02	.19177+03	.33976+01	.42000+00	.2084+00	.4514-03
3	.18929+02	.17426+02	.10862+01	.14443+01	-.17336+02	.19487+03	.35219+01	.44333+00	.1994+00	.4739-03
4	.18236+02	.16763+02	.10879+01	.29464+01	-.17603+02	.20117+03	.36842+01	.46667+00	.1781+00	.4950-03
5	.17562+02	.16067+02	.10930+01	.44253+01	-.17456+02	.20231+03	.37969+01	.49000+00	.1764+00	.5256-03
6	.17161+02	.15651+02	.10964+01	.59022+01	-.17266+02	.20560+03	.38981+01	.51333+00	.1656+00	.5569-03
7	.16538+02	.15036+02	.10999+01	.73554+01	-.16859+02	.20676+03	.40092+01	.53667+00	.1635+00	.5958-03
8	.16071+02	.14587+02	.11018+01	.87772+01	-.16375+02	.20905+03	.41113+01	.56000+00	.1566+00	.6382-03
9	.15399+02	.13950+02	.11039+01	.10157+02	-.15737+02	.21029+03	.42383+01	.58333+00	.1543+00	.6891-03
10	.14816+02	.13417+02	.11043+01	.11484+02	-.15013+02	.21218+03	.43612+01	.60667+00	.1492+00	.7466-03
11	.13997+02	.12668+02	.11049+01	.12752+02	-.14174+02	.21342+03	.45272+01	.63000+00	.1474+00	.8159-03
12	.13251+02	.12018+02	.11026+01	.13949+02	-.13259+02	.21523+03	.46918+01	.65333+00	.1430+00	.8960-03
13	.12137+02	.11001+02	.11033+01	.15079+02	-.12278+02	.21656+03	.49549+01	.67667+00	.1418+00	.9943-03
14	.11113+02	.10133+02	.10967+01	.16131+02	-.11245+02	.21866+03	.52206+01	.70000+00	.1372+00	.1110-02
15	.92808+01	.85105+01	.10905+01	.17127+02	-.10267+02	.22065+03	.57850+01	.72333+00	.1358+00	.1246-02

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.23774+02	.22139+02	.10739+01	.00000	-.16228+02	.18702+03	.29148+01	.39000+00	.2112+00	.4588-03
3	.23317+02	.21361+02	.10916+01	.12708+01	-.16551+02	.19118+03	.30356+01	.41167+00	.1984+00	.4794-03
4	.21634+02	.19978+02	.10830+01	.29432+01	-.16667+02	.19317+03	.32005+01	.43333+00	.1962+00	.5061-03
5	.21228+02	.19547+02	.10860+01	.43025+01	-.16695+02	.19748+03	.32956+01	.45500+00	.1815+00	.5321-03
6	.20260+02	.18634+02	.10872+01	.58403+01	-.16478+02	.19936+03	.34223+01	.47667+00	.1779+00	.5663-03
7	.19693+02	.18085+02	.10889+01	.72628+01	-.16165+02	.20225+03	.35220+01	.49833+00	.1691+00	.6028-03
8	.18853+02	.17307+02	.10893+01	.87059+01	-.15690+02	.20426+03	.36454+01	.52000+00	.1644+00	.6468-03
9	.18104+02	.16613+02	.10898+01	.10082+02	-.15119+02	.20665+03	.37682+01	.54167+00	.1580+00	.6965-03
10	.17250+02	.15835+02	.10893+01	.11416+02	-.14432+02	.20889+03	.39082+01	.56333+00	.1525+00	.7546-03
11	.16260+02	.14947+02	.10879+01	.12689+02	-.13657+02	.21113+03	.40752+01	.58500+00	.1474+00	.8227-03
12	.15284+02	.14084+02	.10852+01	.13891+02	-.12803+02	.21366+03	.42545+01	.60667+00	.1411+00	.9021-03
13	.13966+02	.12883+02	.10841+01	.15032+02	-.11899+02	.21598+03	.45141+01	.62833+00	.1369+00	.9979-03
14	.12703+02	.11805+02	.10760+01	.16099+02	-.10948+02	.21902+03	.47887+01	.65000+00	.1295+00	.1110-02
15	.10714+02	.10027+02	.10686+01	.17110+02	-.10045+02	.22190+03	.52956+01	.67167+00	.1253+00	.1229-02

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.22667+02	.21113+02	.10736+01	.00000	-.15395+02	.17128+03	.28316+01	.36000+00	.2744+00	.4800-03
3	.22477+02	.20542+02	.10942+01	.13009+01	-.15637+02	.17447+03	.29260+01	.38000+00	.2646+00	.5026-03
4	.21988+02	.20098+02	.10940+01	.27259+01	-.15983+02	.18170+03	.30567+01	.40000+00	.2390+00	.5219-03
5	.21315+02	.19395+02	.10990+01	.40917+01	-.15865+02	.18270+03	.31442+01	.42000+00	.2378+00	.5536-03
6	.20947+02	.19015+02	.11016+01	.54793+01	-.15746+02	.18652+03	.32313+01	.44000+00	.2249+00	.5846-03
7	.20277+02	.18356+02	.11046+01	.68384+01	-.15393+02	.18775+03	.33227+01	.46000+00	.2227+00	.6244-03
8	.19781+02	.17888+02	.11058+01	.81735+01	-.14981+02	.19034+03	.34102+01	.48000+00	.2147+00	.6671-03
9	.19027+02	.17182+02	.11074+01	.94687+01	-.14414+02	.19167+03	.35164+01	.50000+00	.2124+00	.7189-03
10	.18376+02	.16595+02	.11073+01	.10715+02	-.13774+02	.19375+03	.36204+01	.52000+00	.2067+00	.7768-03
11	.17439+02	.15752+02	.11071+01	.11906+02	-.13022+02	.19505+03	.37574+01	.54000+00	.2050+00	.8466-03
12	.16590+02	.15015+02	.11048+01	.13031+02	-.12207+02	.19695+03	.38944+01	.56000+00	.2006+00	.9264-03
13	.15367+02	.13904+02	.11052+01	.14094+02	-.11333+02	.19830+03	.40991+01	.58000+00	.1997+00	.1023-02
14	.14196+02	.12921+02	.10987+01	.15085+02	-.10416+02	.20034+03	.43102+01	.60000+00	.1958+00	.1136-02
15	.12366+02	.11319+02	.10925+01	.16024+02	-.95484+01	.20226+03	.46857+01	.62000+00	.1945+00	.1273-02

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.26365+02	.24302+02	.10849+01	.00000	-.14704+02	.16806+03	.25209+01	.33000+00	.2715+00	.4869-03
3	.26125+02	.23754+02	.10998+01	.11802+01	-.15015+02	.17281+03	.26118+01	.34833+00	.2587+00	.5079-03
4	.24686+02	.22617+02	.10915+01	.27287+01	-.15143+02	.17491+03	.27344+01	.36667+00	.2551+00	.5350-03
5	.24407+02	.22309+02	.10940+01	.40049+01	-.15194+02	.17921+03	.28115+01	.38500+00	.2400+00	.5614-03
6	.23518+02	.21469+02	.10954+01	.54387+01	-.15013+02	.18116+03	.29126+01	.40333+00	.2358+00	.5963-03
7	.22989+02	.20964+02	.10966+01	.67728+01	-.14749+02	.18412+03	.29958+01	.42167+00	.2266+00	.6336-03
8	.22153+02	.20199+02	.10968+01	.81232+01	-.14330+02	.18617+03	.30977+01	.44000+00	.2217+00	.6786-03
9	.21390+02	.19502+02	.10968+01	.94136+01	-.13822+02	.18859+03	.32005+01	.45833+00	.2152+00	.7292-03
10	.20492+02	.18703+02	.10956+01	.10663+02	-.13207+02	.19083+03	.33172+01	.47667+00	.2098+00	.7883-03
11	.19462+02	.17783+02	.10944+01	.11856+02	-.12512+02	.19301+03	.34545+01	.49500+00	.2050+00	.8571-03
12	.18407+02	.16874+02	.10909+01	.12982+02	-.11746+02	.19544+03	.36021+01	.51333+00	.1993+00	.9367-03
13	.17045+02	.15645+02	.10895+01	.14050+02	-.10936+02	.19761+03	.38044+01	.53167+00	.1957+00	.1032-02
14	.15695+02	.14504+02	.10821+01	.15048+02	-.10088+02	.20036+03	.40203+01	.55000+00	.1897+00	.1142-02
15	.13750+02	.12789+02	.10751+01	.15993+02	-.92835+01	.20295+03	.43702+01	.56833+00	.1864+00	.1268-02

AT LINE 12

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.25426+02	.23235+02	.10943+01	.00000	-.13587+02	.15039+03	.23822+01	.30000+00	.3452+00	.5184-03
3	.25422+02	.22856+02	.11123+01	.11490+01	-.13833+02	.15348+03	.24539+01	.31667+00	.3350+00	.5416-03
4	.25228+02	.22684+02	.11121+01	.24723+01	-.14232+02	.16105+03	.25634+01	.33333+00	.3071+00	.5592-03
5	.24657+02	.22046+02	.11184+01	.37064+01	-.14136+02	.16189+03	.26304+01	.35000+00	.3063+00	.5925-03
6	.24392+02	.21758+02	.11211+01	.49842+01	-.14077+02	.16589+03	.27057+01	.36667+00	.2923+00	.6237-03
7	.23751+02	.21119+02	.11246+01	.62285+01	-.13777+02	.16710+03	.27806+01	.38333+00	.2902+00	.6650-03
8	.23286+02	.20683+02	.11259+01	.74570+01	-.13435+02	.16976+03	.28555+01	.40000+00	.2818+00	.7086-03
9	.22518+02	.19968+02	.11277+01	.86469+01	-.12941+02	.17104+03	.29438+01	.41667+00	.2796+00	.7619-03
10	.21842+02	.19376+02	.11272+01	.97931+01	-.12387+02	.17311+03	.30317+01	.43333+00	.2741+00	.8209-03
11	.20881+02	.18507+02	.11282+01	.10888+02	-.11728+02	.17431+03	.31438+01	.45000+00	.2728+00	.8919-03
12	.19952+02	.17740+02	.11247+01	.11922+02	-.11014+02	.17607+03	.32569+01	.46667+00	.2691+00	.9724-03
13	.18708+02	.16620+02	.11257+01	.12897+02	-.10251+02	.17726+03	.34154+01	.48333+00	.2688+00	.1069-02
14	.17472+02	.15598+02	.11201+01	.13808+02	-.94515+01	.17899+03	.35807+01	.50000+00	.2662+00	.1180-02
15	.15714+02	.14093+02	.11150+01	.14668+02	-.86966+01	.18062+03	.38389+01	.51667+00	.2657+00	.1311-02

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.28407+02	.25786+02	.11017+01	.00000	-.12998+02	.14894+03	.21633+01	.27000+00	.3411+00	.5261-03
3	.28401+02	.25469+02	.11151+01	.10767+01	-.13284+02	.15249+03	.22320+01	.28500+00	.3289+00	.5482-03
4	.27309+02	.24623+02	.11091+01	.24626+01	-.13425+02	.15471+03	.23247+01	.30000+00	.3237+00	.5758-03
5	.27184+02	.24450+02	.11118+01	.36412+01	-.13489+02	.15873+03	.23881+01	.31500+00	.3092+00	.6032-03
6	.26458+02	.23742+02	.11144+01	.49412+01	-.13348+02	.16065+03	.24689+01	.33000+00	.3046+00	.6394-03
7	.26014+02	.23314+02	.11158+01	.61664+01	-.13130+02	.16350+03	.25391+01	.34500+00	.2955+00	.6781-03
8	.25252+02	.22615+02	.11166+01	.73982+01	-.12772+02	.16546+03	.26232+01	.36000+00	.2907+00	.7247-03
9	.24527+02	.21959+02	.11170+01	.85805+01	-.12331+02	.16774+03	.27095+01	.37500+00	.2846+00	.7770-03
10	.23644+02	.21190+02	.11158+01	.97219+01	-.11796+02	.16980+03	.28065+01	.39000+00	.2797+00	.8377-03
11	.22642+02	.20294+02	.11157+01	.10813+02	-.11187+02	.17177+03	.29189+01	.40500+00	.2757+00	.9081-03
12	.21549+02	.19391+02	.11113+01	.11841+02	-.10517+02	.17389+03	.30396+01	.42000+00	.2711+00	.9891-03
13	.20221+02	.18204+02	.11108+01	.12814+02	-.98105+01	.17574+03	.31968+01	.43500+00	.2686+00	.1084-02
14	.18857+02	.17070+02	.11047+01	.13723+02	-.90709+01	.17797+03	.33649+01	.45000+00	.2644+00	.1194-02
15	.17025+02	.15493+02	.10989+01	.14582+02	-.83715+01	.18009+03	.36102+01	.46500+00	.2624+00	.1322-02

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.27400+02	.24398+02	.11231+01	.00000	-.11626+02	.12857+03	.19892+01	.24000+00	.4231+00	.5724-03
3	.27618+02	.24236+02	.11396+01	.98627+00	-.11861+02	.13142+03	.20432+01	.25333+00	.4130+00	.5968-03
4	.27772+02	.24350+02	.11405+01	.21724+01	-.12284+02	.13868+03	.21365+01	.26667+00	.3852+00	.6131-03
5	.27381+02	.23835+02	.11488+01	.32539+01	-.12207+02	.13938+03	.21869+01	.28000+00	.3845+00	.6488-03
6	.27278+02	.23677+02	.11521+01	.43931+01	-.12195+02	.14320+03	.22514+01	.29333+00	.3707+00	.6808-03
7	.26746+02	.23120+02	.11568+01	.54968+01	-.11949+02	.14430+03	.23119+01	.30667+00	.3686+00	.7244-03

8	.26372+02	.22758+02	.11588+01	.55917+01	-.11675+02	.14678+03	.23754+01	.32000+00	.3606+00	.7698-03
9	.25662+02	.22097+02	.11614+01	.74502+01	-.11260+02	.14790+03	.24476+01	.33333+00	.3589+00	.8256-03
10	.25027+02	.21551+02	.11613+01	.86709+01	-.10795+02	.14974+03	.25208+01	.34667+00	.3540+00	.8868-03
11	.24107+02	.20727+02	.11630+01	.96444+01	-.10236+02	.15071+03	.26107+01	.36000+00	.3535+00	.9602-03
12	.23176+02	.19988+02	.11595+01	.10563+02	-.96311+01	.15213+03	.27021+01	.37333+00	.3509+00	.1043-02
13	.21992+02	.18941+02	.11611+01	.11428+02	-.89837+01	.15300+03	.28229+01	.38667+00	.3516+00	.1140-02
14	.20770+02	.17958+02	.11566+01	.12235+02	-.83071+01	.15424+03	.29493+01	.40000+00	.3506+00	.1251-02
15	.19159+02	.16627+02	.11523+01	.12995+02	-.76692+01	.15541+03	.31276+01	.41333+00	.3512+00	.1378-02

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.29644+02	.26363+02	.11244+01	.00000	-.11061+02	.12708+03	.18207+01	.21000+00	.4213+00	.5835-03
3	.29886+02	.26270+02	.11377+01	.95321+00	-.11313+02	.13013+03	.18721+01	.22167+00	.4102+00	.6074-03
4	.29228+02	.25737+02	.11357+01	.21369+01	-.11463+02	.13233+03	.19426+01	.23333+00	.4039+00	.6362-03
5	.29274+02	.25702+02	.11390+01	.31940+01	-.11531+02	.13584+03	.19947+01	.24500+00	.3908+00	.6655-03
6	.28788+02	.25177+02	.11435+01	.43262+01	-.11431+02	.13763+03	.20586+01	.25667+00	.3860+00	.7037-03
7	.28473+02	.24857+02	.11455+01	.54139+01	-.11257+02	.14016+03	.21175+01	.26833+00	.3777+00	.7448-03
8	.27857+02	.24276+02	.11475+01	.64958+01	-.10964+02	.14190+03	.21860+01	.28000+00	.3733+00	.7939-03
9	.27224+02	.23708+02	.11483+01	.75411+01	-.10597+02	.14385+03	.22576+01	.29167+00	.3681+00	.8490-03
10	.26430+02	.23024+02	.11479+01	.85456+01	-.10149+02	.14558+03	.23369+01	.30333+00	.3642+00	.9127-03
11	.25501+02	.22214+02	.11479+01	.95069+01	-.96363+01	.14716+03	.24273+01	.31500+00	.3613+00	.9860-03
12	.24463+02	.21381+02	.11442+01	.10410+02	-.90727+01	.14879+03	.25239+01	.32667+00	.3582+00	.1070-02
13	.23233+02	.20311+02	.11439+01	.11264+02	-.84777+01	.15015+03	.26437+01	.33833+00	.3571+00	.1167-02
14	.21929+02	.19263+02	.11384+01	.12059+02	-.78559+01	.15172+03	.27713+01	.35000+00	.3552+00	.1277-02
15	.20285+02	.17900+02	.11333+01	.12809+02	-.72687+01	.15321+03	.29421+01	.36167+00	.3547+00	.1403-02

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.28313+02	.24324+02	.11640+01	.00000	-.94413+01	.10538+03	.16179+01	.18000+00	.5109+00	.6546-03
3	.28764+02	.24370+02	.11803+01	.80724+00	-.96506+01	.10782+03	.16580+01	.19000+00	.5015+00	.6814-03
4	.29286+02	.24752+02	.11832+01	.18103+01	-.10061+02	.11413+03	.17365+01	.20000+00	.4763+00	.6967-03
5	.29135+02	.24400+02	.11941+01	.27125+01	-.10005+02	.11473+03	.17736+01	.21000+00	.4753+00	.7361-03
6	.29236+02	.24389+02	.11988+01	.36753+01	-.10026+02	.11798+03	.18274+01	.22000+00	.4631+00	.7702-03
7	.28881+02	.23965+02	.12051+01	.46048+01	-.98366+01	.11889+03	.18751+01	.23000+00	.4612+00	.8176-03
8	.28651+02	.23714+02	.12082+01	.55307+01	-.96302+01	.12095+03	.19274+01	.24000+00	.4544+00	.8662-03
9	.28071+02	.23168+02	.12116+01	.64240+01	-.92995+01	.12179+03	.19846+01	.25000+00	.4533+00	.9263-03
10	.27545+02	.22719+02	.12124+01	.72859+01	-.89298+01	.12321+03	.20435+01	.26000+00	.4497+00	.9914-03
11	.26728+02	.22013+02	.12142+01	.81064+01	-.84792+01	.12384+03	.21131+01	.27000+00	.4500+00	.1069-02
12	.25889+02	.21368+02	.12116+01	.88790+01	-.79927+01	.12478+03	.21842+01	.28000+00	.4488+00	.1155-02
13	.24831+02	.20474+02	.12128+01	.96053+01	-.74710+01	.12522+03	.22729+01	.29000+00	.4505+00	.1256-02
14	.23705+02	.19615+02	.12086+01	.10281+02	-.69260+01	.12587+03	.23656+01	.30000+00	.4513+00	.1370-02
15	.22320+02	.18529+02	.12046+01	.10917+02	-.64127+01	.12648+03	.24859+01	.31000+00	.4531+00	.1497-02

AT LINE 17

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.29706+02	.25664+02	.11575+01	.00000	-.88335+01	.10317+03	.14737+01	.15000+00	.5141+00	.6744-03
3	.30204+02	.25767+02	.11722+01	.79953+00	-.90408+01	.10561+03	.15111+01	.15833+00	.5046+00	.7015-03
4	.30044+02	.25540+02	.11763+01	.17396+01	-.91886+01	.10758+03	.15639+01	.16667+00	.4980+00	.7325-03
5	.30268+02	.25633+02	.11808+01	.26379+01	-.92521+01	.11036+03	.16060+01	.17500+00	.4871+00	.7654-03
6	.30091+02	.25327+02	.11881+01	.35625+01	-.91902+01	.11189+03	.16553+01	.18333+00	.4825+00	.8070-03
7	.29948+02	.25138+02	.11913+01	.44729+01	-.90614+01	.11390+03	.17034+01	.19167+00	.4756+00	.8522-03
8	.29547+02	.24727+02	.11949+01	.53664+01	-.88389+01	.11528+03	.17575+01	.20000+00	.4720+00	.9056-03
9	.29065+02	.24294+02	.11964+01	.62362+01	-.85516+01	.11675+03	.18148+01	.20833+00	.4681+00	.9656-03
10	.28435+02	.23756+02	.11970+01	.70674+01	-.82007+01	.11799+03	.18772+01	.21667+00	.4654+00	.1034-02
11	.27643+02	.23097+02	.11968+01	.78634+01	-.77949+01	.11904+03	.19471+01	.22500+00	.4640+00	.1113-02
12	.26749+02	.22404+02	.11939+01	.86080+01	-.73493+01	.12007+03	.20210+01	.23333+00	.4627+00	.1201-02
13	.25684+02	.21530+02	.11929+01	.93111+01	-.68782+01	.12083+03	.21085+01	.24167+00	.4631+00	.1303-02
14	.24525+02	.20655+02	.11874+01	.99631+01	-.63859+01	.12166+03	.22007+01	.25000+00	.4633+00	.1417-02

15	.23152+02	.19564+02	.11822+01	.10579+02	-.56212+01	.12244+03	.23153+01	.25833+00	.4644+00	.1544-02

AT LINE 18

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.27628+02	.22484+02	.12287+01	.00001	-.69388+01	.80284+02	.12368+01	.12000+00	.6124+00	.7969-03
3	.28282+02	.22666+02	.12467+01	.50189+00	-.71062+01	.82144+02	.12655+01	.12667+00	.6047+00	.8284-03
4	.29148+02	.23258+02	.12533+01	.13643+01	-.74561+01	.86871+02	.13284+01	.13333+00	.5847+00	.8442-03
5	.29270+02	.23087+02	.12678+01	.20492+01	-.74241+01	.87375+02	.13547+01	.14000+00	.5834+00	.8900-03
6	.29586+02	.23204+02	.12750+01	.27849+01	-.74595+01	.89711+02	.13970+01	.14667+00	.5742+00	.9288-03
7	.29466+02	.22952+02	.12838+01	.34945+01	-.73304+01	.90354+02	.14326+01	.15333+00	.5727+00	.9830-03
8	.29418+02	.22830+02	.12886+01	.42033+01	-.71898+01	.91755+02	.14731+01	.16000+00	.5679+00	.1038-02
9	.29038+02	.22456+02	.12932+01	.48860+01	-.69527+01	.92245+02	.15156+01	.16667+00	.5674+00	.1106-02
10	.28677+02	.22147+02	.12948+01	.55446+01	-.66869+01	.93096+02	.15600+01	.17333+00	.5654+00	.1179-02
11	.28040+02	.21630+02	.12963+01	.61700+01	-.63587+01	.93326+02	.16101+01	.18000+00	.5665+00	.1265-02
12	.27371+02	.21148+02	.12942+01	.67573+01	-.60040+01	.93724+02	.16613+01	.18667+00	.5668+00	.1359-02
13	.26511+02	.20486+02	.12941+01	.73078+01	-.56225+01	.93723+02	.17217+01	.19333+00	.5693+00	.1468-02
14	.25567+02	.19835+02	.12890+01	.78174+01	-.52237+01	.93786+02	.17842+01	.20000+00	.5715+00	.1588-02
15	.24487+02	.19068+02	.12842+01	.82978+01	-.48478+01	.93846+02	.18600+01	.20667+00	.5742+00	.1720-02

AT LINE 19

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.28017+02	.23028+02	.12166+01	.00000	-.62028+01	.76808+02	.10924+01	.90000-01	.6235+00	.8417-03
3	.28765+02	.23273+02	.12360+01	.59850+00	-.63546+01	.78552+02	.11182+01	.95000-01	.6160+00	.8751-03
4	.29134+02	.23313+02	.12497+01	.12489+01	-.64833+01	.80080+02	.11557+01	.10000+00	.6101+00	.9110-03
5	.29539+02	.23496+02	.12572+01	.19288+01	-.65334+01	.81943+02	.11877+01	.10500+00	.6024+00	.9509-03
6	.29725+02	.23424+02	.12690+01	.25957+01	-.65077+01	.83105+02	.12235+01	.11000+00	.5982+00	.9990-03
7	.29793+02	.23375+02	.12746+01	.32710+01	-.64239+01	.84421+02	.12601+01	.11500+00	.5935+00	.1052-02
8	.29671+02	.23172+02	.12805+01	.39243+01	-.62777+01	.85334+02	.12998+01	.12000+00	.5908+00	.1114-02
9	.29400+02	.22914+02	.12830+01	.45648+01	-.60795+01	.86184+02	.13423+01	.12500+00	.5886+00	.1183-02
10	.29000+02	.22579+02	.12844+01	.51734+01	-.58382+01	.86871+02	.13874+01	.13000+00	.5872+00	.1260-02
11	.28416+02	.22136+02	.12837+01	.57555+01	-.55543+01	.87327+02	.14368+01	.13500+00	.5872+00	.1349-02
12	.27736+02	.21662+02	.12804+01	.62975+01	-.52433+01	.87729+02	.14881+01	.14000+00	.5875+00	.1447-02
13	.26905+02	.21062+02	.12775+01	.68075+01	-.49128+01	.87892+02	.15460+01	.14500+00	.5891+00	.1558-02
14	.25967+02	.20450+02	.12698+01	.72778+01	-.45673+01	.88038+02	.16058+01	.15000+00	.5909+00	.1680-02
15	.24930+02	.19745+02	.12626+01	.77230+01	-.42404+01	.88176+02	.16757+01	.15500+00	.5930+00	.1813-02

AT LINE 20

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.24277+02	.17850+02	.13601+01	.00000	-.39456+01	.52409+02	.78927+00	.60000-01	.7350+00	.1118-02
3	.25008+02	.18082+02	.13830+01	.35066+00	-.40490+01	.53464+02	.80776+00	.63333-01	.7302+00	.1162-02
4	.26041+02	.18625+02	.13981+01	.79564+00	-.42717+01	.56003+02	.85093+00	.66667-01	.7186+00	.1185-02
5	.26418+02	.18613+02	.14193+01	.12014+01	-.42636+01	.56343+02	.86775+00	.70000-01	.7173+00	.1245-02
6	.26882+02	.18774+02	.14319+01	.16360+01	-.42927+01	.57486+02	.89607+00	.73333-01	.7124+00	.1298-02
7	.27014+02	.18695+02	.14450+01	.20568+01	-.42267+01	.57784+02	.91881+00	.76667-01	.7116+00	.1368-02
8	.27143+02	.18683+02	.14529+01	.24769+01	-.41522+01	.58394+02	.94536+00	.80000-01	.7093+00	.1439-02
9	.27012+02	.18511+02	.14592+01	.28813+01	-.40214+01	.58514+02	.97179+00	.83333-01	.7095+00	.1524-02
10	.26848+02	.18369+02	.14616+01	.32707+01	-.38733+01	.58773+02	.99967+00	.86667-01	.7091+00	.1615-02
11	.26462+02	.18099+02	.14621+01	.36396+01	-.36882+01	.58672+02	.10294+01	.90000-01	.7105+00	.1720-02
12	.26020+02	.17839+02	.14586+01	.39843+01	-.34874+01	.58617+02	.10595+01	.93333-01	.7117+00	.1833-02
13	.25432+02	.17481+02	.14548+01	.43060+01	-.32707+01	.58322+02	.10930+01	.96667-01	.7141+00	.1961-02
14	.24748+02	.17119+02	.14456+01	.46013+01	-.30437+01	.58016+02	.11269+01	.10000+00	.7166+00	.2099-02
15	.24034+02	.16725+02	.14371+01	.48813+01	-.28287+01	.57726+02	.11659+01	.10333+00	.7192+00	.2246-02

AT LINE 21

	P	T	RHO	U	V	E	M	Z	DHSTAG	DT
2	.24165+02	.16916+02	.14285+01	.00000	-.28815+01	.46442+02	.59210+00	.30000-01	.7611+00	.1291-02
3	.25206+02	.17186+02	.14667+01	.30914+00	-.29626+01	.47402+02	.60726+00	.31667-01	.7564+00	.1342-02
4	.26217+02	.17433+02	.15039+01	.60754+00	-.30528+01	.48427+02	.63005+00	.33333-01	.7516+00	.1390-02

5	.28865+02	.17615+02	.15251+01	.96175+00	-.30792+01	.49241+02	.64960+00	.35000-01	.7479+00	.1450-02
6	.27505+02	.17739+02	.15505+01	.12910+01	-.30853+01	.49942+02	.67113+00	.36667-01	.7448+00	.1515-02
7	.27856+02	.17801+02	.15649+01	.16341+01	-.30496+01	.50487+02	.69306+00	.38333-01	.7425+00	.1589-02
8	.28087+02	.17809+02	.15771+01	.19626+01	-.29897+01	.50917+02	.71624+00	.40000-01	.7408+00	.1670-02
9	.28074+02	.17748+02	.15818+01	.22854+01	-.28972+01	.51177+02	.74028+00	.41667-01	.7401+00	.1762-02
10	.27938+02	.17656+02	.15823+01	.25909+01	-.27868+01	.51380+02	.76534+00	.43333-01	.7396+00	.1862-02
11	.27572+02	.17487+02	.15768+01	.28807+01	-.26513+01	.51381+02	.79126+00	.45000-01	.7403+00	.1974-02
12	.27093+02	.17303+02	.15658+01	.31489+01	-.25043+01	.51350+02	.81745+00	.46667-01	.7411+00	.2095-02
13	.26460+02	.17053+02	.15516+01	.33983+01	-.23456+01	.51157+02	.84509+00	.48333-01	.7428+00	.2228-02
14	.25690+02	.16795+02	.15296+01	.36267+01	-.21797+01	.50936+02	.87250+00	.50000-01	.7446+00	.2371-02
15	.24924+02	.16517+02	.15090+01	.38451+01	-.20201+01	.50724+02	.90325+00	.51667-01	.7464+00	.2522-02

AT LINE 22

	P	T	RHO	U	V	E	M	Z	CF	CH
2	.19020+02	.80000+01	.23775+01	.00000	.00000	.20000+02	.00000	.89407-08	.0000	.2467+01
3	.19942+02	.80000+01	.24927+01	.00000	.00000	.20000+02	.00000	.94374-08	.5157+00	.2408+01
4	.21329+02	.80000+01	.26661+01	.00000	.00000	.20000+02	.00000	.99341-08	.9701+00	.2349+01
5	.22160+02	.80000+01	.27700+01	.00000	.00000	.20000+02	.00000	.10431-07	.1471+01	.2280+01
6	.22865+02	.80000+01	.28582+01	.00000	.00000	.20000+02	.00000	.10928-07	.1891+01	.2205+01
7	.23385+02	.80000+01	.29232+01	.00000	.00000	.20000+02	.00000	.11424-07	.2294+01	.2122+01
8	.23736+02	.80000+01	.29671+01	.00000	.00000	.20000+02	.00000	.11921-07	.2641+01	.2035+01
9	.23876+02	.80000+01	.29845+01	.00000	.00000	.20000+02	.00000	.12418-07	.2947+01	.1942+01
10	.23843+02	.80000+01	.29804+01	.00000	.00000	.20000+02	.00000	.12914-07	.3204+01	.1850+01
11	.23587+02	.80000+01	.29484+01	.00000	.00000	.20000+02	.00000	.13411-07	.3413+01	.1750+01
12	.23177+02	.80000+01	.28971+01	.00000	.00000	.20000+02	.00000	.13908-07	.3577+01	.1655+01
13	.22598+02	.80000+01	.28247+01	.00000	.00000	.20000+02	.00000	.14404-07	.3699+01	.1555+01
14	.21903+02	.80000+01	.27378+01	.00000	.00000	.20000+02	.00000	.14901-07	.3785+01	.1460+01
15	.21252+02	.80000+01	.26565+01	.00000	.00000	.20000+02	.00000	.15398-07	.3850+01	.1368+01

IV. Reacting thick-shock code

```
@L POP,* PROCN                                                    18 DEC 72          0:18:46.826
POP  3L1  2493 0019
THIS PROC ELEMENT PROCESSED ON 18 DEC 72 AT 00:18:46

000001      PROC ORIGIN 1    ENTRY POINT 1    PROC* COPY
000002                       REAL NU,LEWIS
000003                       PARAMETER NN=45,MM=15,JJ=11
000004                       COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
000005                       COMMON/MAIN2/ACH,UU,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
000006                      1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
000007                       COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
000008                       COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
000009                       COMMON/MAIN5/BETA,SQEZ(NN)
000010                       COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
000011                       COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
000012                       COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
000013                       COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
000014                       COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
000015                       COMMON/HEAT1/Q1,Q2
000016                       COMMON/DIFU1/D1(JJ),D2(JJ)
000017                       COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,HINU,H2XI,H1XI,
000018                      1             H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
000019                       COMMON/TRAN1/AP1,AP2,AP3(10,10)
000020                       END
000021                  C
000022                  C
    PROCN   CODE    PROCEDURE                    29 NOV 72  11:39:17   0  0150 0250    14    22  (DELETED)
                                                                       1  0150 0734    12     1
```

@ FOR,* MAIN.MAIN 18 DEC 72 0:18:47.505

UNIVAC 1108 FORTRAN V EXEC II LEVEL 28A - (EXECB LEVEL E12C10010A)

THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:16:47

MAIN PROGRAM

STORAGE USED: CODE(1) 000967; DATA(3) 000300; BLANK COMMON(2) 000006

COMMON BLOCKS:

0003	MAIN1	000016
0004	MAIN2	000037
0005	MAIN3	000006
0006	MAIN4	000207
0007	MAIN5	000056
0010	BODY1	000113
0011	SHOCK1	000074
0012	REGIN1	003751
0013	THERM1	003751
0014	STRES1	000005
0015	HEAT1	000002
0016	DIFU1	000026
0017	CONR2	000036
0020	TRAN1	000146

EXTERNAL REFERENCES (BLOCK, NAME)

0021	ACHEM
0022	INPUTT
0023	INPUTR
0024	VISFLO
0025	HNOU$
0026	N102$
0027	HNOU$
0030	N101$
0031	EXP
0032	ALOG
0033	NSTOP$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000113	100^F	0000	000114	101^F	0000	000116	102^F	0000	000132	103^F
0000	000142	105^F	0000	000144	106^F	0000	000164	107^F	0000	000177	108^F
0000	000223	110^F	0000	000245	120^F	0001	000013	146^G	0001	000025	154^G
0001	000323	321^G	0001	000365	341^G	0001	000411	351^G	0001	000000	$5L$
0004 R	000000	ACH	0005 R	000005	AIN	0004 R	000033	ANGLE	0020	000000	AP1
0020	000002	AP3	0007 R	000000	BETA	0010	000074	BX1	0010	000055	CURV
0000 R	000110	DT	0004	000015	DT1	0004	000016	DT2	0004 R	000014	DX1
0016	000013	D2	0005 R	000003	EIN	0004 R	000030	ELL	0004 R	000021	EPS
0004 R	000006	GA	0004 R	000004	$GAMMA$	0004 R	000007	GB	0004 R	000010	GC
0004 R	000012	GL	0012	000000	HH1	0012	001243	HH2	0012	002506	HH3
0004	000027	HST	0017	000000	H1	0017	000013	H1NU	0017	000015	H1X1
0017	000006	H123	0017	000001	H2	0017	000016	H2NU	0017	000014	H2X1
0017	000002	H3	0017	000020	H3NU	0017	000017	H3X1	0017	000021	H3X1NU
0017	000005	H31	0000 I	000101	I	0000 I	000107	J	0003 I	000006	JA
0003 I	000010	K	0003 I	000007	KA	0003 I	000013	LB	0003 I	000014	LE
									0004 R	000035	LEMIS

```
0000 I 000106 A       0003 I 000000 MA      0003 I 000004 MC      0003 I 000002 MCM     0000 I 000103 MONTH
0000 I 000105 MYEAR   0003 I 000011 MI      0000 I 000112 N       0003 I 000001 NA      0003 I 000005 NC
0003 I 000003 NCH     0000 I 000104 NDAY    0000 I 000102 NRUN    0006 R 000017 NU      0000 R 000000 NUBAR
0003 I 000012 NI      0013   000000 P       0010   000036 PHI     0005 R 000000 PIN     0014   000000 PII
0014   000001 PI12    0014   000002 PI21    0014   000003 PI22    0014   000004 PI33    0004 R 000004 PR
0011   000055 PSI     0015   000000 Q1      0015   000001 Q2      0004 R 000003 RE      0005 R 000001 RIN
0004 R 000036 RM      0006   000074 S       0000 R 000111 SMIN    0006   000113 SN      0007 R 000001 SQEZ
0006   000132 ST      0004 R 000035 STAB    0006   000151 STN     0006   000170 SXI     0013   002506 T
0004 R 000034 TIME    0005 R 000002 TIN     0004 R 000032 TW      0017   000023 UJ      0004 R 000001 UO
0017   000007 U1      0017   000010 U2      0017   000011 U3      0017   000012 U4      0006 R 000000 XI
0004 R 000031 XIMAX   0010   000000 YB      0011   000000 YS      0004 R 000020 YO      0000 R 000055 ZA
0010   000017 ZB      0011   000017 ZS      0011   000036 ZSY     0004 R 000017 ZO
```

```
00100     1*      C
00100     2*      C                ZD VISCOUS SHOCK LAYER CALCULATION USING CONSERVATIVE
00100     3*      C                EQUATIONS IN THE CURVILINEAR COORDINATE SYSTEM
00100     4*      C                  WITH CHEMICAL REACTIONS
00100     5*      C
00101     6*              INCLUDE PROC,LIST
00103     6*              REAL NU,LEWIS
00104     6*              PARAMETER NN=45,MM=15,JJ=11
00105     6*              COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,MI,NI,LB,LE,JC
00106     6*              COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00106     6*             1DT2,ZD,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00107     6*              COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00110     6*              COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00111     6*              COMMON/MAIN5/EETA,SQEZ(NN)
00112     6*              COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00113     6*              COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00114     6*              COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00115     6*              COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00116     6*              COMMON/STRES1/PII,PI12,PI21,PI22,PI33
00117     6*              COMMON/HEAT1/Q1,Q2
00120     6*              COMMON/DIFU1/D1(JJ),D2(JJ)
00121     6*              COMMON/CONK2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,HINU,H2XI,HIXI,
00121     6*             1                H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
00122     6*              COMMON/TRAN1/AP1,AP2,AP3(10,10)
00123     6*              END
00124     7*              REAL NUBAR
00125     8*              DIMENSION ZA(20),NUBAR(NN)
00125     9*      C
00126    10*          100 FORMAT(1415)
00127    11*          101 FORMAT(7E10.4)
00130    12*          102 FORMAT(1//46X,11HRUN NUMBER I4,4H ON I2,1H/,I2,1H/,I2/45X,3HLB=I3,
00130    13*             1       5X,3HLE=I3)
00131    14*          103 FORMAT(1HO,40X,6HGAMMA=E15.7,7X,5HSTAB=E15.7)
00132    15*          104 FORMAT(12A6)
00133    16*          105 FORMAT(1HO23X12A6)
00134    17*          106 FORMAT(1H1,25X,62H REACTING VISCOUS SHOCK LAYER SOLUTION AT ZERO
00134    18*             1FLOW INCIDENCE / 53X,13H PROGRAM G132)
00135    19*          107 FORMAT(/30X,3HMA=I3,5X,3HNA=,I3,5X,3HKA=I6,5X,3HJA=I6,5X,
00135    20*             1       5HBETA=F5.2)
00136    21*          108 FORMAT(1HO,11H EPS 1 TO 7/7E15.6,1H1)
00137    22*          109 FORMAT(/17X,3HRE=E10.5,7X,3HPR=E10.5,7X,6HLEWIS=,E10.5,7X,3HRN=,
00137    23*             1       E10.5,7X,3HTW=,E10.5)
```

```
00140  24*      110 FORMAT(1HO,4HLB=,E8.4,7X,4HPIN=,E8.4,7X,4HPIN=,E8.4,7X,4HMIN=,E8.4,7X,4HRIN=,E8.4
00140  25*     1     ,7X,4HTIN=,E8.4,7X,4HEIN=,E8.4,7X,4HACH=,E8.4)
00141  26*      120 FORMAT(///,15X,4H ZO=E12.4,10X,4HYO= ,E10.4,10X, 6HXIMAX=,E10.4,
00141  27*     1    10X,6HANGLE=E10.5)
00141  28*      C
00141  29*      C     JC IS THE NUMBER OF DEPENDENT VARIBLES
00141  30*      C     MA IS THE NUMBER OF INTERVALS IN THE XI OR STREAMWISE DIRECTION
00141  31*      C     NA IS THE NUMBER OF INTERVALS IN THE NU OR CROSSSTREAM DIRECTION
00141  32*      C     KA IS THE NUMBER OF TIME STEPS
00141  33*      C     JA IS THE NUMBER OF TIME STEPS FOR OUTPUT
00141  34*      C     LB=0 IS PLANAR FLOW.
00141  35*      C     LB=1 IS AXISYMMETRIC FLOW
00141  36*      C     LE=1 IS ELLIPSOID
00141  37*      C     LE=2 IS PARABOLOID
00141  38*      C     LE=3 IS HYPERBOLIC
00141  39*      C     EPS(1) IS TOLERANCE IN SHOCK CALCULATION
00141  40*      C     RIN (FEET/SECOND)**2.
00141  41*      C     PIN LB/FEET**2.
00141  42*      C     UO  FEET/SECOND
00141  43*      C     RIN SLUGS/FEET**3.
00141  44*      C     TIN RANKINE
00141  45*      C     GAMMA CP/CV
00141  46*      C     STAB =1.
00141  47*      C     ELL   HORIZONTAL/VERTICAL AXIS
00141  48*      C     ZO AND YO ARE THE LOCATION OF BODY ORIGIN
00141  49*      C
00142  50*          5 WRITE(6,106)
00144  51*            READ (5,104)(ZA(I),I=1,12)
00152  52*            WRITE(6,105)(ZA(I),I=1,12)
00160  53*            READ(5,100) NRUN,MONTH,NDAY,MYEAR,LB,LE,JC
00171  54*            READ (5,100) MA,NA,KA,JA
00177  55*            READ (5,101)(EPS(M),M=1,3)
00205  56*            READ (5,101) RE,PR,LEWIS,RN,TW,BETA
00215  57*            READ (5,101) UO,PIN,MIN,GAMMA
00223  58*            READ (5,101) STAB,ELL,ZO,YO,XIMAX,ANGLE
00233  59*           11 WRITE(6,102)NRUN,MONTH,NDAY,MYEAR,LB,LE
00243  60*            WRITE(6,107)MA,NA,KA,JA,BETA
00252  61*            WRITE(6,103)GAMMA,STAB
00256  62*            WRITE(6,109) RE,PR,LEWIS,RN,TW
00265  63*            WRITE(6,120)ZO,YO,XIMAX,ANGLE
00273  64*            GA=GAMMA/(GAMMA-1.)
00274  65*            GB=1./(GAMMA-1.)
00275  66*            GC=(GAMMA+1.)/(GAMMA-1.)
00276  67*            GD=(GAMMA-1.)/2.
00277  68*            GE=(GAMMA+1.)/2.
00300  69*            CALL ACHEM(8,PIN,MIN,RIN)
00301  70*            CALL ACHEM(9,PIN,MIN,TIN)
00302  71*            CALL ACHEM(10,PIN,MIN,AIN)
00303  72*            CALL ACHEM(11,PIN,MIN,EIN)
00304  73*            ACH=UO/AIN
00305  74*            ANGLE=ANGLE*0.01745329252
00305  75*      C
00306  76*            WRITE(6,110)UO,PIN,MIN,RIN,TIN,EIN,ACH
00317  77*            WRITE(6,108)(EPS(M),M=1,3)
00317  78*      C
00325  79*            TIME=0.
00326  80*            K=0
00327  81*            J=0
```

```
00330    82*            MI=0
00331    83*            NI=0
00332    84*            DT=0.
00332    85*      C
00333    86*            SMIN=ACH**2.
00334    87*            DXI=XIMAX/FLOAT(MA)
00335    88*            DND=1./FLOAT(NA)
00336    89*            MC=MA+2
00337    90*            NC=NA+2
00337    91*      C
00340    92*            DO 1 M=2,MC
00343    93*          1 XI(M)=DXI*FLOAT(M-2)
00345    94*            XI(1)=-XI(3)
00345    95*      C
00346    96*            MCM=MC-1
00347    97*            NCM=NC-1
00347    98*      C
00350    99*            DO 2 N=2,NC
00353   100*            NUBAR(N)=DND*FLOAT(N-2)
00354   101*            NU(N)=ALOG(1.-(1.-EXP(BETA))*NUBAR(N))/BETA
00355   102*            SQEZ(N)=-BETA*EXP(BETA*NU(N))/(1.-EXP(BETA))
00356   103*            IF(BETA.LE.0)NU(N)=NUBAR(N)
00360   104*            IF(BETA.LE.0)SQEZ(N)=1.
00362   105*          2 CONTINUE
00362   106*      C
00362   107*      C
00364   108*            CALL INPUTT
00365   109*            CALL INPUTR
00366   110*            CALL VISFLG
00367   111*            K=0
00370   112*            GO TO 5
00370   113*      C
00371   114*            END
00371   115*      C
00371   116*      C
```

```
      END OF COMPILATION:        NO  DIAGNOSTICS.
MAIN                 SYMBOLIC                    29 NOV 72  11:39:19   0  01500750    14   116  (DELETED)
MAIN     CODE        RELOCATABLE                 29 NOV 72  11:39:19   1  01504100    64     1  (DELETED)
                                                                        0  01504224    14    45
```

UNIVAC 1108 FORTRAN V EXEC II LEVEL 29A - (EXEC 8 LEVEL 512D1D0ICA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 09:18:49

SUBROUTINE INPUT1 ENTRY POINT 000126

STORAGE USED: CODE(1) 000423; DATA(2) 000162; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	CONTRL	000004
0004	INPUT1	000324
0005	INPUT2	003524
0006	INPUT3	000003

EXTERNAL REFERENCES (BLOCK, NAME)

0007	SORT
0010	NRDU$
0011	NIO1$
0012	NIO2$
0013	NWDU$
0014	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000571	IBL	0000	000056	110F	0000	000061	111F	0000	000046	112F	0000	000072	114F	
0000	000054	115F	0000	000052	116F	0001	000122	117L	0001	000262	13L	0001	000006	130G	
0000	000066	14F	0000	000076	15F	0000	000100	155F	0001	000074	157G	0001	000706	17L	
0001	000253	171L	0000	000104	18F	0000	000064	200F	0001	000140	203G	0000	000044	204F	
0001	000156	214G	0001	000201	231G	0001	000202	233G	0001	000221	244G	0001	000222	244G	
0001	000244	256G	0001	000301	273G	0001	000302	275G	0001	000327	307G	0001	000330	311G	
0001	000356	327G	0001	000366	332G	0001	000412	344G	0001	000415	347G	0001	000436	356G	
0001	000441	361G	0001	000474	371G	0001	000504	374G	0000	000115	400F	0000	000117	401F	
0001	000530	406G	0001	000533	411G	0001	000554	420G	0001	000557	423G	0001	000611	432G	
0001	000611	435G	0001	000636	451G	0001	000641	454G	0001	000662	463G	0001	000665	466G	
0001	000400	5L	0001	000736	510G	0001	000737	512G	0001	000755	522G	0001	000756	524G	
0001	000453	6L	0001	000516	8L	0000 I	000014	BLANK	0003 L	000003	CATAL	0000 I	000020	CATALY	
0004 R	000000	CDEF	0000 I	000000	DAT	0000 R	000025	END	0000 R	000031	FRAC	0000 I	000015	FROZEN	
0003 L	000000	FROZN	0004 R	000226	HD	0000 R	000032	HDD	0000 I	000026	I	0000 I	000043	II	
0000	000133	INOPS	0003 L	000002	ISOTH	0000 I	000017	ISOTHE	0000 I	000033	J	0000 I	000042	JJ	
0000 I	000041	K	0000 I	000035	L	0000 I	000021	NAM	0000 I	000024	ND	0000 I	000034	NK	
0004 I	000322	NN	0004 I	000323	NR	0000 I	000027	NS	0005 I	003500	NTAB	0000 I	000037	NTB	
0000 I	000036	NTF	0005 I	003454	NTT	0000 R	000040	ROTN	0005 R	003270	ROTNM	0004	000214	S	
0003 L	000001	SIMPL	0000 I	000016	SIMPLE	0005 I	003446	SPECE	0005 I	003100	SPECIE	0005 R	003302	STC	
0004 I	000240	SUB	0005 R	000620	TABLES	0005 R	000000	TEM	0006 R	000002	THIGH	0006 R	000000	TLOW	
0006 R	000001	THID	0000 R	000030	WN	0004 R	000310	WMUL	0004 R	000276	XS				

```
00101      1*          SUBROUTINE INPUT1                                          INPT   4
00101      2*     C                                                               INPT   5
00103      3*          INTEGER SUB,SPECIE,SPECE                                   INPT   6
```

```
00104     4*          INTEGER DAT,BLANK,FROZEN,SIMPLE,ISOTHE,CATALY
00105     5*          LOGICAL FROZN,SIMPL,ISOTH,CATAL
00106     6*          DIMENSION NAM(3),DAT(12)
00107     7*          COMMON/CONTRL/FROZN,SIMPL,ISOTH,CATAL
00110     8*          COMMON/INPUT1/COEF(2,7,10),S(10),MO(10),SUB(10,3),XS(10),AMOL(10),
00110     9*         1NS,NR
00111    10*          COMMON/INPUT2/TEM(20,20),TABLES(20,20,3),SPECIE(20,2,3),ROTNM(10),
00111    11*         1STC(10,10),SPECE(2,3),NTT(20),NTAB(20)
00112    12*          COMMON/INPUT3/TLOW,TMID,THIGH
00113    13*          DATA NO/4HLAST/,END/3HEND/,BLANK/1H /,FROZEN/6HFROZEN/
00120    14*          DATA SIMPLE/6HSIMPLE/,ISOTHE/6HISOTHE/,CATALY/6HCATALY/
00124    15*          DATA NR/3/
00124    16*     C                                                              INPT  49
00124    17*     C
00126    18*          READ(5,204)(DAT(I),I=1,4)
00134    19*      204 FORMAT(6(A6,6A))
00135    20*          IF(DAT(1).EQ.FROZEN)FROZN=.TRUE.
00137    21*          IF(DAT(1).EQ.BLANK)FROZN=.FALSE.
00141    22*          IF(DAT(2).EQ.SIMPLE)SIMPL=.TRUE.
00143    23*          IF(DAT(2).EQ.BLANK)SIMPL=.FALSE.
00145    24*          IF(DAT(3).EQ.ISOTHE)ISOTH=.TRUE.
00147    25*          IF(DAT(3).EQ.BLANK)ISOTH=.FALSE.
00151    26*          IF(DAT(4).EQ.CATALY)CATAL=.TRUE.
00153    27*          IF(DAT(4).EQ.BLANK)CATAL=.FALSE.
00155    28*          WRITE(6,112)(DAT(I),I=1,4)
00163    29*      112 FORMAT(////,20X,6(A6,6A))
00163    30*     C
00163    31*     C    READ IN THERMODYNAMIC COEFFICIENTS
00167    32*          READ(5,115)TLOW,TMID,THIGH
00171    33*          WRITE(6,116)TLOW,TMID,THIGH
00176    34*      116 FORMAT(1H1,3F10.3)
00177    35*      115 FORMAT(3F10.3)
00200    36*          NS=1
00201    37*      117 READ(5,110)(NAM(I),I=1,3),AM,FRAC,HOO
00212    38*          WRITE(6,111)(NAM(I),I=1,3),AM,FRAC,HOO
00223    39*      110 FORMAT(3A4,6X,3E10.4)
00224    40*      111 FORMAT(1X,3A4,8X,3E10.4)
00225    41*          IF(NAM(1).EQ.NO)GO TO 171
00227    42*          READ(5,200)((COEF(I,J,NS),J=1,7),I=1,2)
00240    43*          WRITE(6,200)((COEF(I,J,NS),J=1,7),I=1,2)
00251    44*      200 FORMAT(5E15.8)
00252    45*          AMOL(NS)=AM
00253    46*          XS(NS)=FRAC
00254    47*          MO(NS)=HOO
00255    48*          DO 829 I=1,3
00260    49*      829 SUB(NS,I)=NAM(I)
00262    50*          NS=NS+1
00263    51*          GO TO 117
00263    52*     C
00263    53*     C
00264    54*      171 CONTINUE
00265    55*          WRITE(6,116)
00265    56*     C                                                              TRAN  78
00265    57*     C    READ TRANSPORT CROSSSECTION DATA FROM CARDS
00267    58*          NR=1                                                       TRAN  79
00270    59*       13 CONTINUE                                                   TRAN  80
00271    60*          READ(5,14) ((SPECE(I,L),L=1,3),I=1,2),NTP,NTB,ROTN
00305    61*          WRITE(6,114) ((SPECE(I,L),L=1,3),I=1,2),NTP,NTB,ROTN
```

```
00321    62*      19 FORMAT(2(3A4,6X),2I5,F24.1)
00322    63*     119 FORMAT(1X,2(3A4,6X),2I5,F24.1)
00323    64*         IF(SPECE(I,1).EQ.NO) GO TO 10                          TRAN  83
00324    65*         K=1                                                    TRAN  84
00325    66*         DO 5 J=1,NS                                            TRAN  85
00326    67*       2 DO 4 I=1,3                                             TRAN  90
00328    68*       4 IF(SPECE(K,I).NE.SUB(J,I)) GO TO 5                     TRAN  91
00327    69*         GO TO 6                                                TRAN  92
00340    70*       5 CONTINUE                                               TRAN  93
00342    71*         READ(5,15)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)   TRAN  94
00354    72*         WRITE(6,155)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)
00366    73*         GO TO 13                                               TRAN  95
00367    74*       6 K=2                                                    TRAN  96
00370    75*         DO 8 JJ=1,NS                                           TRAN  97
00373    76*         DO 7 II=1,3                                            TRAN  98
00376    77*       7 IF(SPECE(K,II).NE.SUB(JJ,II)) GO TO 8                  TRAN  99
00401    78*         GO TO 10
00402    79*       8 CONTINUE                                               TRAN 101
00404    80*         READ(5,15)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)   TRAN 102
00416    81*         WRITE(6,15)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)
00430    82*         GO TO 13                                               TRAN 103
00431    83*      10 DO 12 L=1,3                                            TRAN 104
00431    84*         DO 12 I=1,2                                            TRAN 105
00437    85*      12 SPECIE(NK,I,L)=SPECE(I,L)                              TRAN 106
00442    86*         IF(SPECIE(NK,1,1).EQ.NO) GO TO 17                      TRAN 107
00444    87*         NTT(NK)=NTP                                            TRAN 108
00445    88*         NTAB(NK)=NTE                                           TRAN 109
00446    89*         ROTND(NK)=NGIN                                         TRAN 110
00447    90*         READ(5,15)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)
00461    91*         WRITE(6,155)(TEM(NK,I),(TABLES(NK,I,L),L=1,3),I=1,NTP)
00473    92*      15 FORMAT(4F10.4)                                         TRAN 112
00474    93*     155 FORMAT(1X,4F10.4)
00475    94*         NK=NK+1                                                TRAN 113
00476    95*         IF(NK.GT.50) GO TO 17
00500    96*         GO TO 13                                               TRAN 115
00501    97*      17 CONTINUE                                               TRAN 116
00502    98*         WRITE(6,18)                                            TRAN 119
00504    99*      18 FORMAT(1H0,40X,50HTABLES OF TRANSPORT AND RELAXATION DATA ARE FILLTRAN 120
00504   100*         1ED)                                                   TRAN 121
00504   101*    C
00504   102*    C    READ IN STOICHIOTS COEFFICIENTS
00505   103*         NM=NS-1
00506   104*         READ(5,400)((STC(I,J),J=1,NM),I=1,NR)
00517   105*     400 FORMAT( 5F5.0)
00520   106*         WRITE(6,401)((STC(I,J),J=1,NM),I=1,NR)
00531   107*     401 FORMAT(1X,5F5.0)
00532   108*         CALL SORT
00533   109*         RETURN
00534   110*         END
00534   111*    C
00534   112*    C

      END OF COMPILATION:      NO  DIAGNOSTICS.
     INPUT1          SYMBOLIC                29 NOV 72  11:39:21   0  01505412   14   112  (DELETED)
     INPUT1  CODE    RELOCATABLE             29 NOV 72  11:39:21   1  01510452   36     1  (DELETED)
                                                                    0  01510516   14    63
```

UNIVAC 1100 FORTRAN V EXEC II LEVEL 29A -(EXEC8 LEVEL E12R1001DA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:16:54

SUBROUTINE INPUTR ENTRY POINT 000411

STORAGE USED: CODE(1) 000424; DATA(0) 000573; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 INPUT1 000324
0004 INPUR1 000324

EXTERNAL REFERENCES (BLOCK, NAME)

0005 NRDUS
0006 NIO1S
0007 NIO2S
0010 NRDUS
0011 NERR3S

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000504 100F	0000	000317 11F	0000	000320 12F	0000	000323 13F	0000	000355 14F		
0001	000026 142G	0000	000371 15F	0001	000040 150G	0001	000055 157G	0000	000372 16F		
0001	000063 163G	0000	000436 17F	0000	000444 18F	0001	000106 200G	0001	000131 215G		
0001	000145 226G	0001	000162 236G	0001	000167 242G	0001	000204 254G	0001	000205 257G		
0001	000212 262G	0001	000235 274G	0000	000447 30F	0000	000505 300F	0001	000242 300G		
0001	000263 307G	0000	000511 308F	0001	000277 314G	0001	000304 320G	0001	000331 327G		
0001	000344 333G	0001	000362 341G	0000	000501 40F	0000	000512 500F	0000	000540 501F		
0000	000516 700F	0000	000531 800F	0000	000534 900F	0003 R	000240 ANAME	0003 R	000310 ATWT		
0003	000000 CHIGH	0003	000001 CLOW	0003 R	000000 COEF	0004 R	000026 COEFA	0004 R	000052 COEFB		
0004 R	000002 ETA	0004 R	000122 FRACT	0003 R	000226 HZERO	0003	000226 HO	0000 I	000301 I		
0000 I	000312 IDUM	0000 I	000314 IIDUM	0000 I	000307 IJ	0000 I	000313 INDEX	0000	000550 INJPS		
0004 I	000134 IPR	0004 I	000076 ITYPE	0000 I	000311 J	0000 I	000306 JDUM	0000 I	000302 JJ		
0000 I	000315 JJDUM	0000 I	000310 JREACT	0000 I	000316 KDUM	0000 I	000303 LL	0000 I	000304 MM		
0003	000322 NN	0000 I	000305 NN	0003	000323 NR	0004 I	000001 NREACT	0000 I	000300 NS		
0004 I	000000 NSPEC	0000 R	000264 PP	0003	000214 S	0003	000240 SUB	0003	000310 WMOL		
0003 R	000276 XS	0000 R	000170 Z	0000 R	000000 ZQ						

```
00101     1*            SUBROUTINE INPUTR
00103     2*            DIMENSION ZQ(6,20)
00104     3*            DIMENSION CLOW(10,7),CHIGH(10,7)
00105     4*            DIMENSION HZERO(10),ANAME(10),ATWT(10)
00106     5*            DIMENSION Z(12),PP(10,6)
00107     6*            COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
00107     7*           1NM,NR
00110     8*            COMMON/INPUR1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
00110     9*           1FRACT(10),IPR(20,6)
00111    10*            EQUIVALENCE (CHIGH(1,1),COEF(1,1,1)),(CLOW(1,1),COEF(2,1,1)),
00111    11*           1       (HZERO,HO),(ANAME,SUB(1,1)),(ATWT,WMOL)
```

```
00112     12*          11 FORMAT(12A6)
00113     13*          12 FORMAT(1H1,23X,12A6,///)
00114     14*          13 FORMAT(91X,1HN  ,/,72X,19HK = A *EXP(-B/T)*T,/,/2X,21H(UNITS - CC/M
00114     15*            1OLE/SEC),///,17X,19HREACTIONS CONSDERED,30X,1HA,15X,1HB,15X,1HN,
00115     16*            2 20X,6HREACTION,/,/,120A,4HTYPE,)
00115     17*          14 FORMAT(1HO,I2,5X,A6,1H+,A6,1H+,A6,3H = ,A6,1H+,A6,1H+,A6,10X,
00115     18*            1 3E15.5,20X,I2)
00116     19*          15 FORMAT(6A6)
00117     20*          16 FORMAT(////1X,7HSPECIES,5X,10HINIT. MOLE,5X,6HMOL. WT.,30X,      47
00117     21*            1H1EMPERATURE COEFFICIENTS(0-8000 DEGREES KELVIN),/,13X,8HREACTION,
00117     22*            2 25X,6HB(I,1),6X,6HB(I,2),6X,6HB(I,3),6X,6HB(I,4),6X,6HB(I,5),6X,
00117     23*            3 6HB(I,6),6X,6HB(I,7) )
00120     24*          17 FORMAT(1H ,I2,2X,A6,1X,E8.3,2X,F9.5,2X,7E13.7)
00121     25*          18 FORMAT(20X,10F10.2)
00122     26*          30 FORMAT(////,65X,50HTEMPERATURE COEFFICIENTS(8000-30000DEGREES KELV
00122     27*            1IN),/,46X,6HA(I,1),6X,6HA(I,2),6X,6HA(I,3),6X,6HA(I,4),6X,
00122     28*            2 6HA(I,5),6X,6HA(I,6),6X,6HA(I,7)  )
00123     29*          40 FORMAT(1H ,30X,7E13.7)
00124     30*         100 FORMAT(2I2)
00125     31*         300 FORMAT(A6,4X,2F10.5,F10.2)
00126     32*         308 FORMAT(6I1)
00127     33*         500 FORMAT(I1,6X,E10.5,2F10.5)
00130     34*         700 FORMAT(////,30X,19HREACTION TYPES,30X,26HPRODUCT - REACTANT MATRIX
00130     35*            1 )
00131     36*         800 FORMAT(20X,6A6,20X,6I4)
00132     37*         900 FORMAT(4E20.10,/,3E20.10)
00133     38*             READ(5,100) NSPEC,NREACT
00137     39*             NS = NSPEC
00140     40*             READ(5,11) ( Z(I),I=1,12 )
00146     41*             WRITE(6,12) ( Z(I),I=1,12 )
00154     42*             WRITE(6,13)
00156     43*             DO 201 JJ=1,NREACT
00161     44*             READ(5,15) (ZW(I,JJ), I=1,6)
00167     45*             READ(5,500)ITYPE(JJ),COEFA(JJ),COEFB(JJ),ETA(JJ)
00175     46*             WRITE(6,14)JJ,(ZW(LL,JJ),LL=1,6),COEFA(JJ),COEFB(JJ),ETA(JJ),
00175     47*            1 ITYPE(JJ)
00210     48*         201 CONTINUE
00212     49*             WRITE(6,16)
00214     50*             DO 202 MM=1,NSPEC
00217     51*             FRACT(MM)=AS(MM)
00220     52*         202 WRITE(6,17) MM,ANAME(MM),FRACT(MM),ATWT(MM),(COEF(2,NN,MM),NN=1,7)
00233     53*             WRITE(6,30)
00235     54*             DO 50  JDUM=1,NSPEC
00240     55*             WRITE(6,40) (COEF(1,IJ,JDUM),IJ=1,7)
00246     56*          50 CONTINUE
00250     57*             WRITE (6,700)
00252     58*         501 FORMAT(6A6)
00253     59*             DO 31 JREACT=1,NREACT
00256     60*             DO 41 I=1,6
00261     61*             DO 41 J=1,NSPEC
00264  *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00264     62*             IF( ZW(I,JREACT) .EQ. ANAME(J)) IPR(JREACT,I)=J
00266     63*          41 CONTINUE
00271     64*          31 CONTINUE
00273     65*             DO 205 IDUM=1,7
00276     66*         205 READ(5,15)  (PP(IDUM,JDUM), JDUM=1,6)
00305     67*             INDEX= MAXO(NREACT,5)
00306     68*             DO 220 IDUM=1,INDEX
```

```
00311    69*            IF(IIDUM.GT.7)WRITE(6,800)(PP(7,JJDUM),JJDUM=1,6),
00311    70*           1  (IPR(IIDUM,KDUM),KDUM=1,6)
00324    71*       206 IF(IIDUM.LE.7)WRITE(6,800)(PP(IIDUM,JJDUM),JJDUM=1,6),
00324    72*           1  (IPR(IIDUM,KDUM),KDUM=1,6)
00340    73*            DO 207 I=1,NSPEC
00343    74*       207 WRITE(6,18) (HZERO(I))
00347    75*            RETURN
00350    76*            END
00350    77*      C
00350    78*      C
```

```
      END OF COMPILATION:      1 DIAGNOSTICS.
INPUTR          SYMBOLIC        29 NOV 72  11:39:23   0  01512300   14   78  (DELETED)
INPUTR  CODE    RELOCATABLE     29 NOV 72  11:39:23   1  01514404   36    1  (DELETED)
                                                      0  01514450   14   44
```

```
@ FOR,* V.SPLO,VISPLO                                                    18 DEC 72          0:18:53.996
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A  -(EXEC 8 LEVEL E120,00108A)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:18:54

      SUBROUTINE VISPLO    ENTRY POINT 000417

      STORAGE USED: CODE(1) 000432; DATA(3) 000107; BLANK COMMON(2) 000000

      COMMON BLOCKS:

      0003   MAIN1  000016
      0004   MAIN2  000037
      0005   MAIN3  000006
      0006   MAIN4  000207
      0007   MAIN5  000056
      0010   BODY1  000113
      0011   SHOCK1 000078
      0012   BEGIN1 003751
      0013   THERM1 003751
      0014   STRES1 000006
      0015   HEAT1  000002
      0016   DIFU1  000026
      0017   CONR2  000036
      0020   TRAN1  000146
      0021   DIFF1  035002
      0022   DISS1  000013

      EXTERNAL REFERENCES (BLOCK, NAME)

      0023   BODY
      0024   CONVR1
      0025   OUTPUT
      0026   EXIT
      0027   DIFF
      0030   SQRT
      0031   .RWDS
      0032   .IO2S
      0033   .ERR3S

      STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

      0001   000106 145G      0001   000374 15L       0000   000016 150F      0001   000111 150G      0000   000044 160F
      0001   000375 17L       0001   000257 206G      0001   000310 217G      0001   000200 34L       0001   000006 8L
      0013 R 001243 A         0004 R 000000 ACH       0005   000005 AIN       0004   000033 ANGLE     0020   000000 AP1
      0020   000001 AP2       0020   000004 AP3       0007   000000 BETA      0010   000074 BXI       0010   000055 CURV
      0000 R 000003 DAM       0000 R 000004 DEM       0000 R 000015 DEM1      0000 R 000000 DIM       0004   000013 DNU
      0000 R 000011 DOM       0000 R 000014 DOM1      0000 R 000005 DS        0022 R 000012 DT        0000 R 000002 DTT
      0004 R 000015 DT1       0004 R 000016 DT2       0000 R 000013 DUM       0004 R 000014 DXI       0016   000000 D1
      0016   000013 D2        0005   000003 EIN       0004   000030 ELL       0004   000021 EPS       0004   000024 ERR
      0004   000006 GA        0004 R 000002 GAMMA     0004   000007 GB        0004   000010 GC        0004   000011 GD
      0004   000012 GE        0012   000000 HH1       0012   001243 HH2       0012   002506 HH3       0005   000004 HIN
      0004   000027 HST       0017   000000 H1        0017   000013 H1NU      0017   000015 H1X1      0017   000003 H12
      0017   000006 H123      0017   000001 H2        0017   000016 H2NU      0017   000014 H2X1      0017   000004 H23
      0017   000002 H3        0017   000020 H3NU      0017   000017 H3X1      0017   000021 H3X1NU    0017   000022 H3X1X1
```

```
0017  000005 H31      0000  000056 IMJPS    0003 I 000006 JA       0003  000015 JC       0003 I 000010 K
0003 I 000007 KA      0000 I 000010 KM      0000 I 000001 L        0003  000013 LB       0003   000014 LC
0004 R 000035 LEWIS   0000 I 000026 M       0003   000000 MA       0003 I 000004 MC       0003 I 000002 MCM
0003 I 000011 N1      0000 I 000007 N       0003   000001 NA       0003 I 000005 NC       0003 I 000003 NCM
0004 R 000017 NU      0003 I 000012 NX      0013 R 000000 P        0010  000036 PHI      0005   000000 PIN
0014   000000 PI11    0014   000001 PI12    0014   000002 PI21     0014  000003 PI22     0014   000004 PI33
0004   000004 PR      0011   000055 PSI     0015   000000 Q1       0015  000001 Q2       0000 R 000012 RANGE
0004 R 000003 RE      0005   000001 RIN     0004   000036 RN       0006 R 000074 S        0006   000113 SN
0007   000001 SQEZ    0006 R 000132 ST      0004 R 000005 STAB     0006  000151 STN      0006   000170 SX1
0015   002506 T       0004 R 000039 TIME    0005   000002 TIN      0004  000032 TW       0021 R 000000 U
0017   000023 U3      0021   016401 UN      0004   000001 U0       0017  000007 U1       0017   000010 U2
0017   000011 U3      0017   000012 U4      0022   000000 WWW      0006  000000 X1       0004   000031 XIMAX
0010   000006 YB      0011   000000 YS      0004   000020 YU       0010  000017 ZB       0011   000017 ZS
0011   000036 ZSY     0004   000017 ZU
```

```
00101     1*          SUBROUTINE VISFLO
00101     2*     C
00103     3*          INCLUDE PROC,LIST
00104     4*          REAL NU,LEWIS
00105     5*          PARAMETER NN=45,MM=15,JJ=11
00106     6*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
00107     7*          COMMON/MAIN2/ACM,UU,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107     8*         1DTZ,ZU,YU,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110     9*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    10*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00112    11*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    12*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    13*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115    14*          COMMON/REGION1/HM1(NN,MM),HM2(NN,MM),HM3(NN,MM)
00116    15*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    16*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120    17*          COMMON/HEAT1/Q1,Q2
00121    18*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    19*          COMMON/CONK2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    20*         1                H2NU,H3XI,H3NU,H3XINU,H3XIXI,UU(JJ)
00123    21*          COMMON/TRANI/AP1,AP2,AP3(10,10)
00124    22*          END
00125    23*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00126    24*          COMMON/DISS1/WWW(10),DT
00126    25*     C
00127    26*       150 FORMAT(1HO,4HSTEP,I4,7H, TIME=  E11.4,20H, STANDOFF DISTANCE=  E11
00127    27*         1       .4/9X,5HWMAX=  E11.4,7H, WMIN=  E11.4,9H, WRANGE=  E11.4,14
00127    28*         2       H, MAXIM PRESS=  E11.4)
00127    29*     C
00127    30*     C
00127    31*     C    ********************************************************************
00130    32*          CALL BODY
00131    33*          CALL CONVRT
00132    34*          CALL OUTPUT
00132    35*     C    ********************************************************************
00132    36*     C
00132    37*     C
00132    38*     C    START TIME-DEPENDENT CALCULATION
00133    39*          K=K+1
00134    40*          L=L+1
```

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00134    22*     C
00134    23*     C      DETERMINE STEP SIZE
00134    24*     C
00135    25*             DT1=DT
00136    26*             N1=0
00137    27*             M1=0
00140    28*             DAM=S(2)*(NC(NC)-NU(NC,2))
00141    29*             DEM=DAM
00142    30*             DS=AMIN1(DAM,DEM)
00143    31*             DT=STAB*DS/1.5/(SQRT((U(NC,2,2)/U(NC,2,1))**2.+(U(NC,2,3)/U(NC,2,1
00143    32*            1        ))**2.)+A(NC,2))
00144    33*             DO 34 M=2,MCM
00147    34*             DO 34 N=2,NCM
00152    35*             DAM=S(M)*(NC(N+1)-NU(N,1))
00153    36*             DS=AMIN1(DAM,DEM)
00154    37*             DT1=STAB*DS/1.5/(SQRT((U(N,M,2)/U(N,M,1))**2.+(U(N,M,3)/U(N,M,1)
00154    38*            1        **2.)+A(N,M))
00155    39*             DT2=DS**2./2./(SQRT(GAMMA/ACH/RE)
00156    40*             IF(RE.LT.0.1)DT2=1.0
00160    41*             DT1=AMIN1(DT1,DT2)
00161    42*             IF(DT1-DT)35,34,34
00164    43*          35 DT=DT1
00165    44*             N1=N
00166    45*             M1=M
00167    46*          34 CONTINUE
00172    47*             IF(DT.LT.0.) CALL EXIT
00174    48*             DT1=DT
00175    49*             DT2=DTT/3.
00176    50*             IF(DT2.GT.DT1)DT2=DT1
00200    51*             IF(K.EQ.1)DT2=0.001*DT
00203    52*     C
00200    53*     C      INTERMEDIATE OUTPUT
00200    54*     C
00202    55*          20 KM=K-1
00203    56*             DAM=ST(2)
00204    57*             DOM=DAM
00205    58*             DO 22 M=3,MC
00210    59*             DAM=AMAX1(ST(M),DAM)
00211    60*          22 DOM=AMIN1(ST(M),DOM)
00213    61*             RANGE=ABS(DAM-DOM)
00214    62*             DIM=S(2)
00215    63*             DOM=P(NC,2)
00216    64*             DO 221 M=3,MC
00221    65*             DOM1=P(NC,M)
00222    66*             DEM1=S(M)
00223    67*             DIM=AMIN1(DIM,DEM1)
00224    68*         221 DOM=AMAX1(DOM,DOM1)
00226    69*             TIME=TIME+DT1
00227    70*             WRITE(6,150)KM,TIME,DIM,DAM,DOM,RANGE,DUM
00240    71*             WRITE(6,160)DT1,DT2
00244    72*         160 FORMAT(  )
00244    73*     C
00244    74*     C
00244    75*     C
00244    76*     C      ***************************************************************
00245    77*             CALL DIFF
00245    78*     C      ***************************************************************
00245    79*     C
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00245     80*     C
00246     81*           IF(K.GE.KA) GO TO 17
00250     82*           IF(L.LT.JA) GO TO 15
00250     83*     C     **********************************************************
00252     84*        16 CALL OUTPUT
00252     85*     C     **********************************************************
00253     86*           L=0
00254     87*        15 GO TO 8
00254     88*     C
00255     89*        17 CALL OUTPUT
00256     90*           RETURN
00257     91*           END
00257     92*     C
00257     93*     C
```

END OF COMPILATION: NO DIAGNOSTICS.

VISFLO	SYMBOLIC	29 NOV 72	11:39:07	0	01474526	14 93	(DELETED)
VISFLO CODE	RELOCATABLE	29 NOV 72	11:39:07	1	01477154	96 1	(DELETED)
				0	01472314	14 34	

UNIVAC 1100 FORTRAN V EXEC 11 LEVEL 25A -(EA6C6 LEVEL E12C1G01CA)

THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:18:56

SUBROUTINE BODY ENTRY POINT 000416

STORAGE USED: CODE(1) 000424; DATA(0) 000127; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000016
0004	MAIN2	000037
0005	MAIN3	000060
0006	MAIN4	000207
0007	MAIN5	000056
0010	BODY1	000113
0011	SHOCK1	000074
0012	REGIN1	003751
0013	THERM1	003751
0014	STRES1	000006
0015	HEAT1	000002
0016	DIFU1	000026
0017	CONR2	000036
0020	TRAN1	000146

EXTERNAL REFERENCES (BLOCK, NAME)

0021	EXIT
0022	COS
0023	SIN
0024	WERR2S
0025	SQRT
0026	ATAN
0027	WEXP6S
0030	WADD5
0031	WIO2S
0032	WERR3S

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000047	100F	0001	000004	11L	0001	000062	12L	0001	000205	13L	0001	000206	14L
0001	000040	141G	0001	000273	15L	0000	000051	20UF	0001	000342	217G	0001	000371	234G
0002	000065	5COF	0013	001243	A	0000 R	000042	AA	0004	000000	ACH	0005	000005	AIN
0004 R	000033	ANGLE	0020	000000	AP1	0020	000001	AP2	0020	000002	AP3	0007	000000	BETA
0010 R	000074	BX1	0010 R	000055	CURV	0004	000013	DNU	0004	000015	DT1	0004	000016	DT2
0004 R	000014	BX1	0016	000000	D1	0016	000013	D2	0005	000003	EIN	0004 R	000030	ELL
0004	000021	EPS	0004	000024	ERR	0004	000006	GA	0004	000002	GAMMA	0004	000007	GB
0004	000010	GC	0004	000011	GD	0004	000012	GE	0012	000000	HH1	0012	001243	HH2
0012	002506	HH3	0005	000004	HIN	0004	000027	HST	0017	000000	HI	0017	000013	HINU
0017	000015	H1X1	0017	000003	H12	0017	000006	H123	0017	000001	H2	0017	000016	H2NU
0017	000014	H2X1	0017	000004	H23	0017	000002	H3	0017	000020	H3NU	0017	000017	H3X1
0017	000021	H3X1NU	0017	000022	H3X1X1	0017	000005	H31	0000	000105	INUPS	0003	000006	JA
0003	000015	JC	0003	000010	K	0003	000007	KA	0003	000013	LB	0003	000014	LE
0004 R	000035	LEWIS	0000	000037	M	0003	000000	MA	0003	000004	MC	0003	000002	MCM

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0001   000011 A1      0000 I 000046 A      0003   000001 AA      0003 I 000005 AC      0003   000003 ACM
0005 A 000017 AD      0003   000012 B1      0013   000000 B       0010 R 000036 BBI     0005   000000 BIN
0014   000000 BIII    0014   000021 BII2    0014   000002 BI21    0014   000003 BI22    0014   000004 BI33
0004   000004 BR      0011   000055 BSI     0015   000000 C1      0015   000001 C2      0004   000003 RE
0005   000001 BIN     0004   000036 BN      0006   000074 S       0006   000113 SN      0007 R 000001 SQEZ
0008   000132 ST      0004   000005 STAB    0006   000151 STN     0006   000170 SXI     0013   002506 T
0000 R 000036 TANE    0004   000039 TIME    0005   000002 TIP     0004   000032 TA      0017   000023 U3
0004   000001 U6      0017   000007 U1      0017   000010 U2      0017   000011 U3      0017   000012 U4
0008   000000 XI      0004 R 000031 XIMAX   0010 R 000000 YB      0000 R 000041 YBAR    0000 R 000043 YMAX
0011   000000 YS      0000 R 000045 YY      0004   000020 YO      0010 R 000017 ZB      0000 R 000040 ZBAR
0000 R 000000 ZBY     0000 R 000017 ZBYY    0000 R 000044 ZMAX    0011   000017 ZS      0011   000036 ZSY
0004 R 000017 ZO
```

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00101    1*          SUBROUTINE BODY
00101    2*    C     LIMITED TO ANALYTIC BODY SHAPE
00103    3*          INCLUDE PROC,LIST
00104    3*          REAL NU,LEWIS
00105    3*          PARAMETER NN=45,MM=15,JJ=11
00106    3*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,MI,NI,LB,LE,JC
00107    3*          COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107    3*         1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110    3*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    3*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00112    3*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    3*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    3*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115    3*          COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116    3*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    3*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120    3*          COMMON/HEAT1/Q1,Q2
00121    3*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    3*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    3*         1            H2NU,H3XI,H3NU,H3XINU,H3XIXI,DU(JJ)
00123    3*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124    3*          LOG
00125    4*          DIMENSION ZBY(MM),ZBYY(MM)
00125    5*    C
00126    6*      100 FORMAT(2I5,2F12.6)
00127    7*      200 FORMAT(1H1,20X,2HM=,10X,3HXI=,10X,3HZB=,10X,3HYB=,10X,4HZBY=,10X
00127    8*         1       ,5HCURV=)
00130    9*      500 FORMAT(20X,I2,5X,F8.4,12X,F6.3,6X,F9.5,5X,F9.5,5X,F6.3,6X,F9.5,5X
00130   10*         1       ,F9.5)
00130   11*    C
00131   12*          IF(LL.NE.0) GO TO 11
00133   13*          CALL EXIT
00134   14*       11 CONTINUE
00134   15*    C
00135   16*          PHI(2)=1.57079633
00136   17*          ZB(2)=ZO+1./ELL
00137   18*          TANE=SIN(ANGLE)/COS(ANGLE)
00140   19*          DO 1 M=2,MC
00143   20*          YB(M)=YB(M-1)+DXI*SIN(PHI(M-1))
00144   21*          YB(2)=0.
00144   22*    C
00145   23*          GO TO (12,13,14),LE
```

```
00145   24*     C       ELLIPSOID AND CONE
00146   25*       12    ZBAR= ZO*TANE/(ELL*SQRT(ELL**2.+TANE**2.))
00147   26*             YBAR=ELL/SQRT(ELL**2.+TANE**2.)
00150   27*             AA=YBAR+ZBAR*TANE
00151   28*             IF(YB(N).LE.YBAR)ZB(N)=ZO-SQRT(1.-YB(N)**2.)/ELL
00153   29*             IF(YB(N).LE.YBAR)ZBY(N)=-YB(N)/ELL**2./(ZB(N)-ZO)
00155   30*             IF(YB(N).LE.YBAR)ZBYY(N)=-(1.+ELL**2.*ZBY(N)**2.)/ELL**2./
00156   31*            1        (ZB(N)-ZO)
00157   32*             IF(YB(N).GE.YBAR)ZB(M)=-(YB(N)-AA)/TANE
00161   33*             IF(YB(N).GE.YBAR)ZBY(N)=-1./TANE
00163   34*             IF(YB(N).GE.YBAR)ZBYY(N)=0.
00165   35*             GO TO 15
00166   36*       13
00166   37*     C       PARBOLOID AND CONE
00166   38*             GO TO 15
00167   39*       14
00167   40*     C       HYPERBOLOID
00167   41*             ELL=TANE
00170   42*             AA=1./ELL**2.
00171   43*             YMAX=YMAX
00172   44*             ZMAX=SQRT((YMAX/ELL)**2.+AA**2.)
00173   45*             ZB(2)=ZMAX-SQRT((YB(2)/ELL)**2.+AA**2.)
00174   46*             ZB(N)=ZMAX-SQRT((YB(M)/ELL)**2.+AA**2.)
00175   47*             ZBY(M)=-YB(N)/ELL**2./(ZMAX-ZB(M))
00176   48*             ZBYY(N)=(-1.-(ELL*ZBY(M))**2.)/ELL**2./(ZMAX-ZB(M))
00177   49*             GO TO 15
00200   50*       15 CONTINUE
00201   51*             BX1(M)=0.
00202   52*             PHI(N)=PHI(2)-ATAN(ABS(ZBY(M)))
00203   53*             CURV(N)=ZBYY(M)/(1.+ZBY(M)**2.)**1.5
00203   54*     C       POSITIVE CURVATURE FOR CONVEX BODY IN THE Y DIRECTIONS
00204   55*             CURV(N)=ABS(CURV(N))
00204   56*     C
00205   57*         1 CONTINUE
00205   58*     C
00207   59*             BX1(1)=-BX1(3)
00210   60*             CURV(1)=CURV(3)
00211   61*             PHI(1)=PHI(3)
00212   62*             YB(1)=YB(3)
00213   63*             ZB(1)=ZB(3)
00213   64*     C
00214   65*             WRITE(6,200)
00216   66*             DO 20 N=2,MC
00221   67*             YY=DX1*FLOAT(M-2)
00222   68*       20 WRITE(6,500)N,YY,ZB(M),YB(M),PHI(M),CURV(M)
00222   69*     C
00233   70*             DO 30 N=2,NC
00236   71*       30    WRITE(6,500)N,SQEZ(N)
00236   72*     C
00243   73*             RETURN
00244   74*             END
00244   75*     C
00244   76*     C
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FORM 1401-3

END OF COMPILATION: NO DIAGNOSTICS.

BODY	SYMBOLIC	29 NOV 72	11:39:25	0	01515620	14	76 (DELETED)
BODY	CODE RELOCATABLE	29 NOV 72	11:39:25	1	01517670	64	1 (DELETED)

```
@ FOR,* CONVRI,CONVRI                                          18 DEC 72          0:18:58.241
UNIVAC 1108 FORTRAN V EXEC 1, LEVEL 28A  -(EXEC8 LEVEL E12D100(A)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:18:56

SUBROUTINE CONVRI     ENTRY POINT 000307

STORAGE USED: CODE(1) 000326; DATA(2) 000050; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003  MAIN1  000016
0004  MAIN2  000037
0005  MAIN3  000006
0006  MAIN4  000207
0007  MAIN5  000056
0010  BODY1  000113
0011  SHOCK1 000074
0012  REGIN1 003751
0013  THERM1 003751
0014  STRES1 000005
0015  HEAT1  000002
0016  DIFU1  000026
0017  CONR2  000036
0020  TRAN1  000146
0021  DIFF1  035002
0022  INPUR1 000324

EXTERNAL REFERENCES (BLOCK, NAME)

0023  REGION
0024  SQRT
0025  COS
0026  SIN
0027  EXP
0030  NERR35

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001  000007 132G    0001  000033 141G    0001  000047 144G    0001  000162 162G    0001  000223 173G
0001  000225 176G    0001  000226 201G    0001  000246 212G    0013 R 001243 A       0004 R 000000 ACH
0005  000005 AIN     0004  000033 ANGLE   0020  000000 AP1     0020  000001 AP2     0020  000002 AP3
0007  000000 BETA    0010  000074 BXI     0021 R 023615 C       0022  000026 COEFA   0022  000052 COEFB
0010  000055 CURV    0004  000013 DNU     0004  000015 DT1     0004  000016 DT2     0004 R 000014 DXI
0016  000000 D1      0016  000013 D2      0021 R 022352 E       0005 R 000003 EIN     0004  000030 ELL
0004  000021 EPS     0004  000024 ERR     0022  000002 ETA     0022 R 000122 FRACT   0004  000006 GA
0004 R 000002 GAMMA   0004  000007 GB      0004  000010 GC      0004  000011 GD      0004  000012 GE
0012  000000 HH1     0012  001243 HH2     0012  002506 HH3     0005  000004 HIN     0004  000027 HST
0017  000000 H1      0017  000013 H1NU    0017  000015 H1XI    0017  000003 H12     0017 R 000006 H123
0017  000001 H2      0017  000016 H2NU    0017  000014 H2XI    0017  000004 H23     0017  000002 H3
0017  000020 H3NU    0017  000017 H3XI    0017  000021 H3XINU  0017  000022 H3XIXI  0017  000005 H31
0000  000013 INJPS   0022  000134 IPR     0022  000076 ITYPE   0000 I 000002 J       0003  000006 JA
0003 I 000015 JC      0003  000010 K       0003  000007 KA      0003  000013 LB      0003  000014 LE
0004 R 000035 LEWIS   0000 I 000000 M       0003  000000 MA      0003 I 000004 MC      0003 I 000002 MCM
0003  000011 MI      0000 I 000001 N       0003  000001 NA      0003 I 000005 NC      0003  000003 NCM
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FORM 1411-3

0022	000001	NREACT	0022	000000	NSPEC	0006 R	000017	NU	0003	000012	N1	0013 R	000000	P	
0014 R	000036	PHI	0005 R	000000	PIN	0014	000000	PI11	0014	000001	PI12	0014	000002	PI21	
0014	000003	PI22	0014	000004	PI33	0004	000004	PR	0011	000055	PSI	0021 R	000000	Q	
0015	000000	R1	0015	000000	Q2	0021 R	016401	R	0004	000003	RE	0005 R	000001	RIN	
0004	000036	RM	0006 R	000074	S	0006	000113	SN	0007	000001	SQEZ	0006	000132	ST	
0004	000005	STAB	0006	000151	STN	0006 R	000170	SXI	0013 R	002506	T	0004	000034	TIME	
0005	000002	TIN	0004	000032	TM	0021 R	017644	U	0017	000023	UJ	0021 R	016401	UN	
0004	000001	U0	0017	000007	U1	0017	000010	U2	0017	000011	U3	0017	000012	U4	
0021 R	021107	V	0006	000000	XI	0004	000031	XIMAX	0010	000000	YB	0011	000000	YS	
0004	000020	YS	0010	000017	ZB	0011	000017	ZS	0011	000036	ZSY	0004	000017	ZO	

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00101    1*          SUBROUTINE CONVRT
00101    2*      C
00103    3*          INCLUDE PROC,LIST
00104    3*          REAL NU,LEWIS
00105    3*          PARAMETER NN=45,MM=15,JJ=11
00106    3*          COMMON/MAIN1/NA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
00107    3*          COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107    3*         1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110    3*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    3*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00112    3*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    3*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    3*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115    3*          COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116    3*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    3*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120    3*          COMMON/HEAT1/Q1,Q2
00121    3*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    3*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    3*         1             H2NU,H3XI,H3NU,H3XINU,H3X1X1,UJ(JJ)
00123    3*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124    3*          END
00125    4*          DIMENSION R(NN,MM),U(NN,MM),V(NN,MM),E(NN,MM),C(NN,MM,7)
00126    5*          COMMON/DIFF1/W(NN,MM,JJ),UN(NN,MM,JJ)
00127    6*          COMMON/INPUT1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
00127    7*         1FRACT(10),IPR(20,6)
00130    8*          EQUIVALENCE (UN(1,1,1),R(1,1)),(UN(1,1,2),U(1,1)),(UN(1,1,3),V(
00130    9*         1             1,1),(UN(1,1,4),E(1,1)),(UN(1,1,5),C(1,1,1))
00130   10*      C
00131   11*          DO 6 M=2,MC
00134   12*        6 S(M)=0.6*(M-2)/2./MC
00136   13*          S(1)=S(3)
00137   14*          CALL REGION
00137   15*      C
00140   16*          DO 1 M=1,MC
00143   17*          DO 1 N=2,NC
00146   18*          H123=1.
00147   19*          A(N,M)=SQRT(GAMMA)
00150   20*          E(N,M)=EIN/PIN*RIN
00151   21*          U(N,M)=SQRT(GAMMA)*ACH*COS(PHI(M))
00152   22*          V(N,M)=-SQRT(GAMMA)*ACH*SIN(PHI(M))
00153   23*          Q(N,M,1)=H123*EXP(R(N,M))
00154   24*          Q(N,M,2)=Q(N,M,1)*U(N,M)
00155   25*          Q(N,M,3)=Q(N,M,1)*V(N,M)
```

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00155     26*                V(N,M,4)=Q(N,M,1)*(E(N,M)+0.5*(U(N,M)**2.+V(N,M)**2.))
00157     27*                T(N,M)=1.
00160     28*                P(N,M)=EXP(P(N,M))
00161     29*                DO 11 J=5,JC
00164     30*                C(N,M,J-4)=FRACT(J-4)
00165     31*             11 Q(N,M,J)=C(N,M,J-4)*Q(N,M,1)
00167     32*              1 CONTINUE
00167     33*          C
00172     34*                DO 2 J=1,JC
00175     35*                DO 2 M=1,MC
00200     36*                DO 2 N=2,NC
00203     37*                Q(N,M,J)=Q(N,M,J)*S(M)
00204     38*                UN(N,M,J)=Q(N,M,J)
00205     39*              2 CONTINUE
00205     40*          C
00211     41*                DO 5 M=3,MCM
00214     42*              5 SXI(M)=(S(M+1)-S(M-1))/2./DXI
00216     43*                SXI(MC)=2.*SXI(MCM)-SXI(MCM-1)
00217     44*                SXI(1)=-SXI(3)
00220     45*                SXI(2)=0.
00220     46*          C
00221     47*                RETURN
00222  *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00222     48*                END

      END OF COMPILATION:          1 DIAGNOSTICS.
CON/R1              SYMBOLIC          29 NOV 72  11:39:27   0  01520732   14   72  (DELETED)
CON/R1  CODE        RELOCATABLE       29 NOV 72  11:39:27   1  01522712   84    1  (DELETED)
                                                            0  01523036   14   25
```

SUBROUTINE REGION ENTRY POINT 005077

STORAGE USED: CODE(1) 000106; DATA(3) 000235; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000016
0004	MAIN2	000037
0005	MAIN3	000006
0006	MAIN4	000207
0007	MAIN5	000056
0010	MOUT1	000113
0011	SHOCK1	000074
0012	MEGIN1	003751
0013	THERM1	003751
0014	STRES1	000005
0015	HEAT1	000002
0016	DIF01	000026
0017	CONK2	000036
0020	TRAN1	000146

EXTERNAL REFERENCES (BLOCK, NAME)

0021	COS
0022	MERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000020	I26G	0001	000533	I3IG	0013	001243	A	0004	000000	ACH
0004	000033	ANGLE	0020	000000	AP1	0020	000001	AP2	0020	000002	AP3
0010	000074	BX1	0010 R	000055	CURV	0004	000013	DNU	0004	000015	DT1
0004	000014	DX1	0016	000000	D1	0016	000013	D2	0005	000003	EIN
0004	000021	EPS	0004	000024	ERR	0004	000006	GA	0004	000002	GAMMA
0004	000010	GC	0004	000011	GO	0004	000012	GE	0012 R	000000	HH1
0012 R	002506	HH3	0005	000004	HIN	0004	000027	HST	0017	000000	H1
0017	000015	H1X1	0017	000004	H12	0017	000006	H123	0017	000001	H2
0017	000014	H2X1	0017	000004	H23	0017	000002	H3	0017	000020	H3NU
0017	000021	H3X1NU	0017	000022	H3X1X1	0017	000005	H31	0000	000003	INJPS
0003	000015	JC	0003	000010	K	0003	000007	KA	0003 I	000013	LB
0004 X	000035	LEWIS	0000 I	000000	M	0003	000000	MA	0003 I	000004	MC
0003	000011	MI	0000 I	000001	N	0003	000001	NA	0003 I	000005	NC
0006 X	000017	NU	0003	000012	NJ	0013	000000	P	0010 R	000036	PHI
0014	000000	PI11	0014	000001	PI12	0014	000002	PI21	0014	000003	PI22
0004	000004	PR	0011	000055	PSI	0015	000000	Q1	0015	000001	Q2
0005	000001	RIN	0004	000030	RM	0006 R	000074	S	0006	000113	SN
0006	000132	ST	0004	000005	STAB	0006	000151	STN	0006	000170	SX1
0004	000034	TIME	0005	000002	TIN	0004	000032	TM	0017	000023	U3
0017	000007	U1	0017	000010	U2	0017	000011	U3	0017	000012	U4
0004	000031	XIMAX	0010 R	000053	YB	0011	000000	YS	0004	000020	YO
0011	000017	ZS	0011	000036	ZSY	0004	000017	ZO			

0004	000000	ACH	0005	000005	AIN	0020	000001	AP2	0020	000002	AP3
0007	000000	BETA	0004	000015	DT1	0004	000016	DT2	0004	000013	DNU
0016	000013	D2	0005	000003	EIN	0004	000030	ELL	0004	000027	HST
0004	000002	GAMMA	0004	000007	GB	0004	000011	GO	0004	000012	GE
0012 R	000000	HH1	0012 R	001243	HH2	0017	000013	H1NU	0017	000004	H12
0017	000006	H123	0017	000001	H2	0017	000016	H2NU	0017	000004	H23
0017	000002	H3	0017	000020	H3NU	0017	000017	H3X1	0017	000022	H3X1X1
0017	000005	H31	0000	000003	INJPS	0003	000006	JA	0003	000010	K
0003	000007	KA	0003 I	000013	LB	0003	000014	LE	0003	000000	MA
0003 I	000004	MC	0003	000002	MCM	0003	000001	NA	0003 I	000005	NC
0003	000003	NCM	0003	000012	NJ	0013	000000	P	0010 R	000036	PHI
0005	000000	PIN	0014	000001	PI12	0014	000002	PI21	0014	000003	PI22
0014	000004	PI33	0011	000055	PSI	0015	000000	Q1	0015	000001	Q2
0004	000003	RE	0004	000030	RM	0006 R	000074	S	0006	000113	SN
0007	000001	SQEZ	0004	000005	STAB	0006	000151	STN	0006	000170	SX1
0013	002506	T	0004	000034	TIME	0005	000002	TIN	0004	000032	TM
0017	000023	U3	0004	000001	U0	0017	000007	U1	0017	000010	U2
0017	000011	U3	0017	000012	U4	0006	000000	X1	0004	000031	XIMAX
0010 R	000053	YB	0011	000000	YS	0004	000020	YO	0010	000017	ZB
0011	000036	ZSY	0004	000017	ZO						

```
00101    1*          SUBROUTINE REGION
00101    2*    C
00103    3*          INCLUDE PROC,LIST
00103    4*    C
00104    4*          REAL NU,LEWIS
00105    4*          PARAMETER NN=45,MM=15,JJ=11
00106    4*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
00107    4*          COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107    4*         1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RR
00110    4*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    4*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00112    4*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    4*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    4*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115    4*          COMMON/REGN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116    4*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    4*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120    4*          COMMON/HEAT1/Q1,Q2
00121    4*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    4*          COMMON/COOR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    4*         1            H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
00123    4*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124    4*          END
00125    5*          DO 1 M=1,MC
00130    6*          DO 1 N=2,NC
00133    7*          HH1(N,M)=1.+CURV(M)*S(M)*(1.-NU(N))
00134    8*          HH2(N,M)=1.
00135    9*          HH3(N,M)=YB(M)+S(M)*(1.-NU(N))*COS(PHI(N))
00136   10*          HH3(N,1)=-HH3(N,3)
00137   11*          IF(LB.EQ.3)HH3(N,M)=1.
00137   12*    C
00141   13*        1 CONTINUE
00141   14*    C
00144   15*          RETURN
00145   16*          END
00145   17*    C
00145   18*    C
```

```
      END OF COMPILATION:      NO  DIAGNOSTICS.
REGION          SYMBOLIC        29 NOV 72  11:39:28   0  01523574   14   18  (DELETED)
REGION  CODE    RELOCATABLE     29 NOV 72  11:39:28   1  01524170   72    1  (DELETED)
                                                      0  01524300   14    9
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      IF(UN(N,M,1).LT.UN(2,M,1))UN(N,M,4)=0.5*(UN(N,M,2)**2+UN(N,M,3)**2
     1           )+2.5

      SUBROUTINE DIFF      ENTRY POINT 001704

      STORAGE USED: CODE(1) 002010; DATA(0) 000515; BLANK COMMON(2) 000000

      COMMON BLOCKS:

      0003   MAIN1  000016
      0004   MAIN2  000037
      0005   MAIN3  000006
      0006   MAIN4  000207
      0007   MAIN5  000056
      0010   BODY1  000113
      0011   SHOCK1 000074
      0012   BEGIN1 003751
      0013   THERM1 003751
      0014   STRES1 000005
      0015   HEAT1  000002
      0016   DIFU1  000026
      0017   CONR2  000041
      0020   TRAN1  000146
      0021   DIFF1  035002
      0022   DISS1  000013

      EXTERNAL REFERENCES (BLOCK, NAME)

      0023   CONVR2
      0024   TRANSC
      0025   STRESS
      0026   DIFFUS
      0027   HEAT
      0030   DISSS
      0031   ALL
      0032   THERM
      0033   NERN3S

      STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

      0001   001052 11L     0001   000616 113L    0001   000506 12L     0001   001002 13L     0001   000006 136G
      0001   001032 14L     0001   000046 141G    0001   000702 143L    0001   000105 144G    0001   000144 147G
      0001   001052 15L     0001   000432 224G    0001   000500 237G    0001   000545 250G    0001   000612 262G
      0001   000667 275G    0001   000771 314G    0001   001024 324G    0001   001046 335G    0001   001162 353G
      0001   001214 367G    0001   001617 4L      0001   001441 430G    0001   001454 436G    0001   001522 446G
      0001   001524 452G    0001   001566 462G    0001   001567 465G    0001   001603 475G    0001   000002 5L
      0001   001604 500G    0001   001635 503G    0001   001627 517G    0001   001642 522G    0001   001200 55L
```

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0013	R	001243	A	0004		000013	ACH	0006		000005	AIN	0004		000033	ANGLE	0020	R	000000	API
0020		000001	AP2	0020		000002	AP3	0007		000000	BETA	0010	R	000074	BXI	0010		000055	CURV
0017	R	000027	DISS	0004	R	000013	DNU	0000	R	000362	DS	0022	R	000012	DT	0000	R	000365	DTT
0004	R	000015	DTI	0004	R	000016	DT2	0004	R	000014	DXI	0016	R	000000	DZ	0016	R	000013	D2
0005		000003	EIN	0004		000030	ELL	0004		000021	EPS	0004		000024	ERR	0000	R	000030	F
0000	R	000370	FXI	0000	R	000373	G	0004		000006	GA	0004		000002	GAMMA	0004		000007	GB
0004		000010	GC	0004		000011	GD	0004		000012	GE	0000	R	000367	GNU	0000	R	000336	H
0012	R	000000	HH1	0012	R	001243	HH2	0012	R	002506	HH3	0005		000004	HIN	0004		000027	HST
0017	R	000000	H1	0017	R	000013	H1NU	0017		000015	H1XI	0017	R	000003	H12	0017	R	000006	H123
0017	R	000001	H2	0017		000010	H2NU	0017		000014	H2XI	0017	R	000004	H23	0017	R	000002	H3
0017	R	000020	H3NU	0017	R	000017	H3XI	0017	R	000021	H3XINU	0017	R	000022	H3XIXI	0017	R	000005	H31
0000	I	000364	I	0000	I	000361	II	0000	I	000366	III	0000		000416	INJPS	0000	I	000360	J
0003		000006	JA	0003	I	000015	JC	0003		000010	K	0003		000007	KA	0003	I	000013	LB
0003		000014	LE	0004	R	000035	LEWIS	0000	I	000353	M	0003		000000	MA	0003	I	000004	MC
0003	I	000002	MCM	0000	I	000355	MI	0000	I	000357	ML	0003		000011	MI	0000	I	000352	N
0003		000001	NA	0003	I	000005	NC	0003		000003	NCM	0000	I	000354	NI	0000	I	000356	NL
0000	I	000363	NSPEC	0006	R	000017	NU	0003		000012	NI	0013	R	000000	P	0010		000036	PHI
0005		000000	PIN	0014	R	000000	PI11	0014	R	000001	PI12	0014	R	000002	PI21	0014	R	000003	PI22
0014	R	000004	PI33	0004		000004	PR	0011		000055	PSI	0015	R	000000	QI	0015	R	000001	Q2
0004		000003	RE	0005		000001	RIN	0004		000036	RN	0009	R	000361	RR	0006	R	000074	S
0006		000113	SN	0007		000001	SQEZ	0006		000132	ST	0004		000005	STAB	0006		000151	STN
0000	D	000000	SUM	0006	R	000173	SXI	0013	R	002506	T	0004		000034	TIME	0005		000002	TIN
0004		000032	TW	0021	R	000000	U	0000	D	000002	UD	0017	R	000023	UJ	0021	R	016401	UN
0000	R	000371	UT	0000	R	000372	UU	0004		000001	UU	0017	R	000007	UI	0017	R	000010	U2
0017	R	000011	U3	0017	R	000012	U4	0022	R	000000	WWW	0006		000000	XI	0004		000031	XIMAX
0010		000000	YB	0011		000000	YS	0004		000020	YO	0010		000017	ZB	0011		000017	ZS
0011		000036	ZSY	0004		000017	ZO												

```
00101    1*          SUBROUTINE DIFF
00101    2*      C
00103    3*          INCLUDE PROC,LIST
00104    3*          REAL NU,LEWIS
00105    3*          PARAMETER NN=45,MM=15,JJ=11
00106    3*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,MI,NI,LB,LE,JC
00107    3*          COMMON/MAIN2/ACH,UD,GA,MA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107    3*         1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110    3*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    3*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00112    3*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    3*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    3*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115    3*          COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116    3*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    3*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120    3*          COMMON/HEAT1/Q1,Q2
00121    3*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    3*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    3*         1                H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
00123    3*          COMMON/TRAN1/API,AP2,AP3(10,10)
00124    3*          END
00125    4*          DOUBLE PRECISION SUM,UD
00126    5*          DIMENSION UD(JJ)
00127    6*          DIMENSION F(3,3,JJ),G(3,3,JJ),H(JJ),DISS(10)
00130    7*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00131    8*          COMMON/DISS1/WWW(10),DT
```

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00132     9*          EQUIVALENCE (DISS,UU(5))
00132    10*     C
00132    11*     C   SOLVE THE DIFFERENTIAL EQUATION
00132    12*     C
00133    13*          II=-1
00134    14*        9 CONTINUE
00135    15*          DO 1 N=3,NC
00140    16*          DO 1 M=2,MCM
00143    17*               DO 11 NI=1,3
00146    18*               DO 11 MI=1,3
00151    19*          IF(NI.NE.2.AND.MI.NE.2) GO TO 11
00153    20*               IF(NI.EQ.1)NL=N-1
00155    21*               IF(NI.EQ.2)NL=N
00157    22*               IF(NI.EQ.3)NL=N+1
00161    23*               IF(MI.EQ.1)ML=M-1
00163    24*               IF(MI.EQ.2)ML=M
00165    25*               IF(MI.EQ.3)ML=M+1
00167    26*          IF(NL.EQ.1.OR.NL.EQ.NC+1) GO TO 11
00171    27*          IF(II.EQ.-1.AND.MI+NI.GT.4.AND.N.NE.2) GO TO 11
00173    28*          IF(II.EQ.1.AND.MI+NI.LT.4.AND.N.NE.NC) GO TO 11
00173    29*     C
00175    30*          H1=HH1(NL,ML)
00176    31*          H2=HH2(NL,ML)
00177    32*          H3=HH3(NL,ML)
00200    33*          H12=H1*H2
00201    34*          H23=H2
00202    35*          H31=H1
00203    36*          H123=H12
00204    37*          IF(M.GE.4)H23=H2*H3
00206    38*          IF(M.GE.4)H31=H3*H1
00210    39*          IF(M.GE.4)H123=H12*H3
00210    40*     C
00212    41*          CALL CONVR2(NL,ML)
00213    42*          CALL TRANSC(NL,ML)
00214    43*          CALL STRESS(NL,ML)
00215    44*          CALL DIFFUS(NL,ML)
00216    45*          CALL HEAT(NL,ML)
00216    46*     C      VECTORS IN THE PHYSICAL SPACE
00217    47*            F(NI,MI,1)=H23*U1*U2
00220    48*            F(NI,MI,2)=H23*(U1*U2*U2+PI11)
00221    49*            F(NI,MI,3)=H23*(U1*U2*U3+PI12)
00222    50*            F(NI,MI,4)=H23*((U1*U4+PI11)*U2+PI12*U3+W1)
00223    51*          DO 101 J=5,JC
00226    52*      101 F(NI,MI,J)=H23*(U1*U2*UU(J)+D1(J-4))
00226    53*     C
00230    54*          IF(MI.NE.2) GO TO 12
00232    55*            G(NI,MI,1)=H31*U1*U3
00233    56*            G(NI,MI,2)=H31*(U1*U2*U3+PI21)
00234    57*            G(NI,MI,3)=H31*(U1*U3*U3+PI22)
00235    58*            G(NI,MI,4)=H31*((U1*U4+PI22)*U3+PI21*U2+W2)
00236    59*          DO 102 J=5,JC
00241    60*      102 G(NI,MI,J)=H31*(U1*U3*UU(J)+D2(J-4))
00243    61*       12 CONTINUE
00243    62*     C
00243    63*     C      VECTORS IN THE COMPUTATIONAL PLANE
00243    64*     C
00244    65*          IF(NI.NE.2.OR.MI.NE.2) GO TO 13
00246    66*          RR=((1.-NU(NL))*SA1(ML)+BA1(ML))/S(ML)
```

```
00247    67*            DO 153 J=1,JC
00252    68*      153   H(J)=0.
00254    69*              H(2)=S(ML)*((-1./S(ML))*H1NU*(U1*U2*U3+P112))
00255    70*              H(3)=S(ML)*(-(-1./S(ML))*H1NU*(U1*U2*U2+P111))
00256    71*            IF(N.EQ.2.OR.N.EQ.NC) GO TO 113
00260    72*            CALL DISSS(U1,T(NL,ML),DISS)
00261    73*            DO 103 J=5,JC
00264    74*      103   H(J)=-H123*S(ML)*U1*AAA(J-4)
00266    75*      113   CONTINUE
00267    76*            IF(LB.EQ.0) GO TO 13
00271    77*            IF(M.NE.2) GO TO 143
00273    78*            H(3)=H(3)-S(ML)*H1*PI33*(-1./S(ML))*H3XINU/H3XI
00274    79*            DO 123 J=1,JC
00277    80*      123   H(J)=H(J)+S(ML)*((-1./S(ML))*H3XINU*G(NI,MI,J)+(H3XIXI+
00277    81*           1     (1.-NU(NL))*(SXI(ML+1)-SXI(ML-1))/S(ML)**2.*H3NU)*F(NI,MI,J))/
00277    82*           2       H3XI
00301    83*            GO TO 13
00302    84*      143   CONTINUE
00303    85*            H(2)=H(2)-S(ML)*H2/H3*(H3XI+RR*H3NU)*PI33
00304    86*            H(3)=H(3)-S(ML)*H1/H3*(-1./S(ML))*H3NU*PI33
00305    87*            IF(M.GE.4)H(2)=H(2)*H3
00307    88*            IF(M.GE.4)H(3)=H(3)*H3
00311    89*            IF(M.GE.4) GO TO 13
00313    90*            DO 133 J=1,JC
00316    91*      133   H(J)=H(J)+S(ML)/H3*((H3XI+RR*H3NU)*F(NI,MI,J)+(-1./S(ML))*
00316    92*           1          H3NU*G(NI,MI,J))
00320    93*       13   CONTINUE
00320    94*       C
00321    95*            IF(MI.NE.2) GO TO 14
00323    96*            DO 104 J=1,JC
00326    97*      104   G(NI,MI,J)=-G(NI,MI,J)+(1.-NU(NL))*(SXI(ML)*F(NI,MI,J))
00330    98*       14   CONTINUE
00330    99*       C
00331   100*            IF(NI.NE.2) GO TO 15
00333   101*            DO 105 J=1,JC
00336   102*      105   F(NI,MI,J)=S(ML)*F(NI,MI,J)
00340   103*       15   CONTINUE
00340   104*       C
00341   105*        11    CONTINUE
00341   106*       C
00344   107*            DS=S(M)*DNU
00345   108*            NSPEC=JC-4
00346   109*            DT1=AMIN1(DXI/(ABS(U(N,M,2)/U(N,M,1))+A(N,M)),
00346   110*           1                  DNU*S(M)/(ABS(U(N,M,3)/U(N,M,1))+A(N,M)))/3.
00347   111*            DT=DS**2/API/8.
00350   112*            DT1=AMIN1(DT1,DT)
00351   113*            DT=0.1/ABS(AAA(NSPEC))
00352   114*            DO 55 I=1,NSPEC
00355   115*            IF(ABS(AAA(I)).GT.0.)DTT=0.1/ABS(AAA(I))
00357   116*            IF(DTT-DT)45,55,55
00362   117*       45   DT=DTT
00363   118*       55   CONTINUE
00365   119*            DT2=AMIN1(DT,DT1)
00365   120*       C
00366   121*              DO 22 J=1,JC
00371   122*              III=II
00371   123*       C
00372   124*              IF(N.EQ.2) II=1
```

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00374   125*            IF(N.EQ.NC)II=-1
00376   126*             GNU=((II-1)*G(1,2,J)-2*II*G(2,2,J)+(II+1)*G(3,2,J))/2./DNU
00377   127*            II=III
00400   128*             FXI=((III-1)*F(2,1,J)-2*II*F(2,2,J)+(II+1)*F(2,3,J))/2./DXI
00400   129*      C
00401   130*          IF(L.EQ.1.AND.M.EQ.2)FXI=2.*FXI
00403   131*             UT=-FXI-GNU-H(J)
00404   132*          UT=UT/HH1(N,M)/HH2(N,M)
00405   133*          IF(M.GE.4)UT=UT/HH3(N,M)
00407   134*          DTT=DT1
00410   135*          IF(J.GE.5)DTT=DT2
00412   136*             IF(III.EQ.-1)UN(N,M,J)=U(N,M,J)+UT*DTT
00414   137*             IF(III.EQ.1)UN(N,M,J)=0.5*(UN(N,M,J)+U(N,M,J)+UT*DTT)
00416   138*          IF(J.GE.5.AND.UN(N,M,J).LE.0)UN(N,M,J)=0.
00420   139*          IF(UN(N,M,1).LT.S(M))UN(N,M,1)=S(M)
00422   140*          IF(UN(N,M,1).LT.UN(2,M,1))UN(N,M,4)=0.5*(UN(N,M,2)**2+UN(N,M,3)**2          *NE*
00422   141*         1           )+2.5                                                          *NE*
00424   142*       22 CONTINUE
00424   143*      C
00426   144*          SUM=0.
00427   145*          DO 33 J=5,JC
00432   146*          UD(J)=UN(N,M,J)/UN(N,M,1)
00433   147*       33 SUM=SUM+UD(J)
00433   148*      C
00435   149*          DO 44 J=5,JC
00440   150*       44 UN(N,M,J)=UD(J)/SUM*UN(N,M,1)
00442   151*        1 CONTINUE
00442   152*      C
00442   153*      C
00442   154*      C     EXTRAPOLATION TO THE AXIS OF SYMMETRY
00442   155*      C
00442   156*      C
00442   157*      C     EXTRAPOLATION TO OUTER BOUNDARY
00442   158*      C
00445   159*          DO 2 N=3,NC
00450   160*          UN(N,2,2)=0.
00451   161*          DO 2 J=1,JC
00454   162*          UN(N,MC,J)=2.*UN(N,MCM,J)-UN(N,MCM-1,J)
00455   163*        2 CONTINUE
00455   164*      C
00460   165*          CALL WALL
00460   166*      C
00460   167*      C
00460   168*      C     DEFINE MIRROR POINTS
00460   169*      C
00461   170*          DO 3 N=3,NC
00464   171*          DO 3 J=1,JC
00467   172*          UN(N,1,J)=UN(N,3,J)
00470   173*          UN(N,1,2)=-UN(N,3,2)
00471   174*        3 CONTINUE
00471   175*      C
00471   176*      C
00471   177*      C     STORE VALUES TO DIFFERENT LEVEL
00471   178*      C
00474   179*          DO 4 N=1,NC
00477   180*          DO 4 J=1,JC
00502   181*          UU=U(N,M,J)
00505   182*
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00506    183*          U(N,1,J)=UN(1,N,J)
00507    184*          IF(II.EQ.1) GO TO 4
00511    185*          UN(N,M,J)=UU
00512    186*        4 CONTINUE
00512    187*    C
00512    188*    C     EXTRAPOLATION TO THE AXIS OF SYMMETRY
00512    189*    C
00516    190*          DO 6 N=3,NC
00521    191*          DO 7 M=2,MC
00524    192*          CALL CONVR2(N,M)
00525    193*          U4=U4-0.5*(U2**2.+U3**2.)
00526    194*          CALL THERM(2,U1,U4,T(N,M))
00527    195*          CALL THERM(1,U1,U4,P(N,M))
00530    196*          CALL THERM(3,U1,U4,A(N,M))
00531    197*        7 CONTINUE
00533    198*          P(N,1)=P(N,3)
00534    199*          T(N,1)=T(N,3)
00535    200*          A(N,1)=A(N,3)
00536    201*        6 CONTINUE
00536    202*    C
00540    203*          IF(II.EQ.1) RETURN
00542    204*          II=1
00543    205*          GO TO 5
00543    206*    C
00544   *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00544    207*          END
00544    208*    C
00544    209*    C
```

END OF COMPILATION: 1 DIAGNOSTICS.

DIFF		SYMBOLIC	15 DEC 72	09:04:20	0	01601036	14	216 (DELETED)
DIFF	CODE	RELOCATABLE	15 DEC 72	09:04:20	1	01606756	96	1 (DELETED)
					0	01607116	14	108

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@ FOR,* CONVR2,CONVR2                                                    18 DEC 72          0:19: 6.560
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 29A  -(EXEC8 LEVEL L12G1301GA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:06

    SUBROUTINE CONVR2    ENTRY POINT 000247

    STORAGE USED: CODE(1) 000236; DATA(3) 000032; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   MAIN1  000016
    0004   MAIN2  000037
    0005   MAIN3  000000
    0006   MAIN4  000237
    0007   MAIN5  000056
    0010   BODY1  000113
    0011   SHOCK1 000074
    0012   REGIN1 003751
    0013   THERM1 003751
    0014   STRES1 000005
    0015   HEAT1  000002
    0016   DIFU1  000026
    0017   CONR2  000036
    0020   TRAN1  000146
    0021   DIFF1  035002

    EXTERNAL REFERENCES (BLOCK, NAME)

    0022   COS
    0023   UERR3S

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001  000045 1346    0013  001243 A       0004  000000 ACH     0005  000005 AIN     0004  000033 ANGLE
    0020  000000 AP1     0020  000001 AP2     0020  000002 AP3     0007  000000 BETA    0010  000074 BX1
    0010 R 000055 CURV   0004  000013 DNU     0004  000015 DT1     0004  000016 DT2     0004 R 000014 DX1
    0016  000000 D1      0016  000013 D2      0005  000003 EIN     0004  000030 ELL     0004  000021 EPS
    0004  000024 ERR     0004  000000 GA      0004  000002 GAMMA   0004  000007 GB      0004  000010 GC
    0004  000011 GD      0004  000012 GE      0012 R 000000 HH1     0012  001243 HH2     0012 R 002506 HH3
    0005  000004 HIN     0004  000027 HST     0017  000000 H1      0017 R 000013 H1NU    0017 R 000015 H1X1
    0017  000003 H12     0017  000000 H123    0017  000001 H2      0017 R 000016 H2NU    0017 R 000014 H2X1
    0017  000004 H23     0017  000002 H3      0017 R 000020 H3NU    0017 R 000017 H3X1    0017 R 000021 H3X1NU
    0017 R 000022 H3X1X1  0017  000005 H31     0000  000005 INJPS   0000 I 000001 J       0003  000006 JA
    0003 I 000015 JC      0003  000010 K       0003  000007 KA      0003 I 000013 LB      0003  000014 LE
    0004 R 000035 LEWIS   0003  000000 MA      0003 I 000004 MC      0003 I 000002 MCM     0003  000011 MI
    0003  000001 NA      0003  000005 NC      0003  000003 NCM     0006 R 000017 NU      0003  000012 N1
    0013  000000 P       0010 R 000036 PHI     0005  000000 PIN     0014  000000 PI11    0014  000001 PI12
    0014  000002 PI21    0014  000003 PI22    0014  000004 PI33    0004  000004 PR      0011  000055 PSI
    0015  000000 Q1      0015  000001 Q2      0004  000003 RE      0005  000001 RIN     0004  000036 RN
    0004 R 000074 S       0006  000113 SN      0007 R 000001 SQEZ    0006  000132 ST      0004  000005 STAB
    0006  000151 STN     0000 R 000000 SUM     0006  000170 SX1     0013  002506 T       0004  000034 TIME
    0005  000002 TIN     0004  000032 TW      0021 R 000000 U       0017 R 000023 U1      0021  016401 UN
    0004  000001 U0      0017 R 000007 U1      0017 R 000010 U2      0017 R 000011 U3      0017 R 000012 U4
    0006  000000 X1      0004  000031 XIMAX   0010  000000 YB      0011  000000 YS      0004  000020 Y0
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```
00101    1*          SUBROUTINE CONVR2(N,M)
00103    2*          INCLUDE PROC,LIST
00104    2*          REAL HD,LEWIS
00105    2*          PARAMETER NN=45,MM=15,JJ=1
00106    2*          COMMON/MAIN1/MA,NA,MCN,NCM,MC,NC,JA,KA,K,N1,M1,LB,LE,JC
00107    2*          COMMON/MAIN2/ACH,HD,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107    2*         1DT2,Z0,Y0,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110    2*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    2*          COMMON/MAIN4/X1(MM),NU(NN),S(MM),SN(MM),ST(MM),SN(MM),SXI(MM)
00112    2*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    2*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    2*          COMMON/SHOCK1/YS(MM),ZS(MM),ZST(MM),PSI(MM)
00115    2*          COMMON/REG1N1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116    2*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    2*          COMMON/STRES1/P11,P112,P121,P122,P133
00120    2*          COMMON/HEAT1/Q1,Q2
00121    2*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    2*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    2*         1             H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
00123    2*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124    2*          END
00125    3*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00125    4*     C
00125    5*     C
00125    6*     C
00125    7*     C    U1=RHO,U2=U,U3=V,U4=E+0.5*Q**2.
00126    8*          U1=U(N,M,1)/S(M)
00127    9*          U2=U(N,M,2)/U(N,M,1)
00130   10*          U3=U(N,M,3)/U(N,M,1)
00131   11*          U4=U(N,M,4)/U(N,M,1)
00132   12*          SUM=0.
00133   13*          DO 2 J=5,JC
00136   14*        2 UJ(J)=U(N,M,J)/U(N,M,1)
00136   15*     C
00136   16*     C    EASIER TO CALCULATE H1XI AND H3XI THIS WAY
00140   17*          H1XI=(HH1(N,M+1)-HH1(N,M-1))/2./DXI
00141   18*          IF(M.EQ.MC)H1XI=(HH1(N,MC)-HH1(N,MCM))/DXI
00143   19*          H1NU=-CURV(M)*S(M)
00144   20*          H1NU=H1NU*SQEZ(N)
00145   21*          H2XI=0.
00145   22*          H2NU=0.
00147   23*          H3XI=(HH3(N,M+1)-HH3(N,M-1))/2./DXI*LB
00150   24*          IF(M.EQ.1)H3XI=(HH3(N,4)-HH3(N,2))/2./DXI *LB
00152   25*          IF(M.EQ.MC)H3XI=(HH3(N,MC)-HH3(N,MCM))/DXI*LB
00154   26*          H3NU=-S(M)*COS(PHI(M))*LB
00155   27*          IF(M.EQ.1)H3NU=S(1)*COS(PHI(1))*LB
00157   28*          H3NU=H3NU*SQEZ(N)
00157   29*     C
00160   30*          H3XIXI=0.
00161   31*          H3XINU=-S(M)*LB
00162   32*          H3XINU=H3XINU*SQEZ(N)
00162   33*     C
00162   34*     C
```

```
00163     35*           RETURN
00164     36*           END
00164     37*      C
00164     38*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

CONVR2		SYMBOLIC	29 NOV 72	11:39:30	0	01524476	14	38	(DELETED)
CONVR2	CODE	RELOCATABLE	29 NOV 72	11:39:30	1	01525522	84	1	(DELETED)
					0	01525646	14	18	

UNIVAC 1108 FORTRAN V EXEC II LEVEL 28A -(EXEC8 LEVEL E12C10010A)

THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:09

SUBROUTINE TRANSC ENTRY POINT 000227

STORAGE USED: CODE(1) 000236; DATA(0) 000034; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000016
0004	MAIN2	000037
0005	MAIN3	000006
0006	MAIN4	000207
0007	MAIN5	000056
0010	BODY1	000113
0011	SHOCK1	000074
0012	REGIN1	003751
0013	THERM1	003751
0014	STRES1	000006
0015	HEAT1	000002
0016	DIFU1	000026
0017	CONR2	000036
0020	TRAN1	000146
0021	CONTRL	000004
0022	DIFF1	035002
0023	JANAF1	000031
0024	INPUT1	000324
0025	TRANS1	000245

EXTERNAL REFERENCES (BLOCK, NAME)

0026	JANAF
0027	TRANSP
0030	SQRT
0031	NEXP6$
0032	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000012	141G	0001	000024	147G	0001	000047	160G	0001	000173	177G
0001	000175	202G	0013	001243	A	0004 R	000000	ACH	0005	000005	AIN
0004	000033	ANGLE	0025 R	000062	ANS	0020 R	000000	AP1	0020 R	000002	AP2
0020 R	000004	AP3	0007	000000	BETA	0010	000074	BXI	0021 L	000003	CATAL
0024	000000	COEF	0025	000071	CPEW	0025	000070	CPFROZ	0025 R	000000	CPRR
0023 R	000025	CPTOT	0010	000055	CURV	0025	000024	CVIBR	0023	000026	CVTOT
0004	000013	DNU	0004	000015	DT1	0004	000016	DT2	0004	000014	DXI
0016	000000	D1	0016	000013	D2	0005	000003	EIN	0004	000030	ELL
0004	000021	EPS	0025	000067	EWCON	0004	000024	ERR	0021 L	000000	FROZN
0025	000065	FRZCON	0004	000006	GA	0023 R	000030	GAMA	0004 R	000002	GAMMA
0004	000007	GB	0004	000010	GC	0004	000011	GD	0004	000012	GE
0023	000000	GRRT	0023	000012	HHH	0012	000000	HH1	0012	001243	HH2
0012	002506	HH3	0005	000004	HIN	0025	000012	HRRT	0004	000027	HST
0024	000226	HU	0017	000000	H1	0017	000013	H1NU	0017	000015	H1X1
0017	000003	H12	0017	000006	H123	0017	000001	H2	0017	000016	H2NU
0017	000014	H2X1	0017	000004	H23	0017	000002	H3	0017	000020	H3NU
0017	000017	H3X1	0017	000021	H3X1NU	0017	000022	H3X1X1	0017	000005	H31
0000 I	000000	I	0000	000017	INJPS						

0025	000064	INTCON	0021	L	000002	ISOTH	0000	I	000003	J		0003	000006	JA		0003	I	000015	JC
0003	000010	K	0003		000007	KA	0003		000013	LB		0003	000014	LE		0025	R	000101	LEWI
0004	000035	LEWIS	0003		000000	MA	0003		000004	ML		0003	000002	MLM		0025		000063	MONCON
0003	000011	M1	0003		000001	NA	0003		000005	NC		0003	000003	NCM		0024	I	000322	NM
0024	000123	NR	0006	R	000017	NU	0003		000012	N1		0013	R	000000	P		0010		000036	PHI
0005	000000	PIN	0014		000000	PI11	0014		000001	PI12		0014		000002	PI21		0014		000003	PI22
0014	000004	PI33	0004	R	000004	PR	0025		000072	PRFROZ		0011		000055	PSI		0024		000214	Q
0015	000000	Q1	0015		000001	Q2	0004	R	000003	RE		0025		000066	REACON		0025		000050	RELXTN
0000	000002	REVAR1	0005	R	000001	RIN	0004	R	000036	RN		0025		000036	ROTM		0006		000074	S
0021	000001	SIMPL	0006		000113	SN	0023		000027	SOUND		0007		000001	SQEZ		0006		000132	ST
0004	000005	STAB	0006		000151	STN	0024		000240	SUB		0006		000170	SXI		0013	R	002506	T
0004	000034	TIME	0005	R	000002	TIN	0000	R	000001	TT		0004		000032	TW		0022		000000	U
0017	000023	U0	0022		016401	UN	0004		000001	UO		0017		000007	U1		0017		000010	U2
0017	000011	U3	0017		000012	U4	0025	R	000062	VISC		0024	R	000310	WMOL		0023	R	000024	WSUM
0006	000000	XI	0004		000031	XIMAX	0024	R	000276	XS		0010		000000	YB		0011		000000	YS
0004	000020	YO	0010		000017	ZB	0011		000017	ZS		0011		000036	ZSY		0004		000017	ZO


```
00101    1*          SUBROUTINE TRANSC(N,M)
00103    2*          INCLUDE PROC,LIST
00104    2*          REAL NU,LEWIS
00105    2*          PARAMETER NN=45,MM=15,JJ=11
00106    2*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
00107    2*          COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107    2*         1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110    2*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    2*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00112    2*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    2*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    2*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115    2*          COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116    2*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    2*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120    2*          COMMON/HEAT1/Q1,Q2
00121    2*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    2*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    2*         1            H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
00123    2*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124    2*          END
00125    3*          REAL LEWI
00126    4*          LOGICAL FROZN,SIMPL,ISOTH,CATAL
00127    5*          COMMON/CONTRL/FROZN,SIMPL,ISOTH,CATAL
00130    6*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00131    7*          COMMON/JANAF1/GRRT(10),HHH(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
00132    8*          COMMON/INPUT1/COEF(2,7,10),Q(10),HO(10),SUB(10,3),XS(10),WMOL(10),
00132    9*         1NM,NR
00133   10*          COMMON/TRANS1/CPRR(10),HRRT(10),CVIBR(10),ROTM(10),RELXTN(10),
00133   11*         1ANS(15),LEWI(10,10)
00134   12*          EQUIVALENCE (ANS(1) ,VISC  ), (ANS(2) ,MONCON), (ANS(3) ,INTCON)  INPT  42
00135   13*          EQUIVALENCE (ANS(4) ,FRZCON), (ANS(5) ,REACON), (ANS(6) ,EQCON )  INPT  43
00136   14*          EQUIVALENCE (ANS(7) ,CPFROZ), (ANS(8) ,CPEQ  ), (ANS(9) ,PRFROZ)  INPT  44
00136   15*     C                                                                      INPT  47
00137   16*          WSUM=0.
00140   17*          DO 3 I=5,JC
00143   18*        3 WSUM=WSUM+UJ(I)/WMOL(I-4)
00145   19*          WSUM=1./WSUM
```

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00146     20*          DO 1 I=5,JC
00151     21*      1   XS(I-4)=UJ(I)/WMOL(I-4)*WSUM
00153     22*          TT=T(N,M)*1.8/1.8
00154     23*          TT=ABS(TT)
00155     24*          CALL JANAF(TT)
00156     25*          CPTOT=0.
00157     26*          DO 4 I=5,JC
00162     27*      4   CPTOT=CPTOT+XS(I-4)*CPRR(I-4)
00164     28*          GAMA=CPTOT/(CPTOT-1.)
00165     29*          CALL TRANSP(T(N,M),P(N,M))
00166     30*          REVARI= SQRT(GAMMA)*ACH/(0.06721*VISC)*SQRT(PIN*RIN)*32.174*1.E6
00167     31*          IF(.NOT.SIMPL)PR=ANS(9)
00171     32*          IF(SIMPL)REVARI=RE*(T(N,M)+0.5)/1.5/T(N,M)**1.5
00173     33*          REVARI=REVARI*RN
00174     34*          AP1=GAMMA**0.5*ACH/REVARI
00175     35*          AP2=GAMMA**0.5*ACH*GAMA/(GAMA-1.)/REVARI/PR
00176     36*          DO 2 J=1,NM
00201     37*          DO 2 I=1,NM
00204     38*          IF(SIMPL)LEWI(I,J)=LEWIS
00206     39*      2   APJ(I,J)=GAMMA**0.5*ACH/REVARI/PR*LEWI(I,J)*WMOL(I)/WSUM
00211     40*          RETURN
00212  *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00212     41*          END

      END OF COMPILATION:        1 DIAGNOSTICS.
TRANSC              SYMBOLIC      15 DEC 72  09:04:22   0  01612066   14   44  (DELETED)
TRANSC  CODE        RELOCATABLE   15 DEC 72  09:04:22   1  01613236   96    1  (DELETED)
                                                        0  01613376   14   19
```

```
@ FOR,* TRANSK,TRANSK                                                    18 DEC 72          0:19:11.136
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A  -(EXEC8 LEVEL E)2D100D0A)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:11

     SUBROUTINE TRANSP    ENTRY POINT 000006

     STORAGE USED: CODE(1) 000016; DATA(0) 000005; BLANK COMMON(2) 000000

     EXTERNAL REFERENCES (BLOCK, NAME)

      0003   .ERR3$

     STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

      0000   000000 INJP$

429

00101      1*            SUBROUTINE TRANSP(T,P)
00103      2*            RETURN
00104      3*            END
00104      4*      C
00104      5*      C

     END OF COMPILATION:        NO  DIAGNOSTICS.
TRANSK              SYMBOLIC      29 NOV 72  11:39:31   0  01526242   14   5  (DELETED)
TRANSK  CODE        RELOCATABLE   29 NOV 72  11:39:31   1  01526350   24   1  (DELETED)
                                                        0  01526400   14   2
```

PRINTED IN U.S.A.

FORM 1411-J

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@ FOR,* JANAF,JANAF                                                    18 DEC 72          0:19:12.829
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E1201001CA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:13


    SUBROUTINE JANAF      ENTRY POINT 000152


    STORAGE USED: CODE(1) 000163; DATA(0) 000035; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   INPUT1 000324
    0004   TRANS1 000246
    0005   INPUT3 000003
    0006   MAIN3  000006
    0007   JANAF1 000031

    EXTERNAL REFERENCES (BLOCK, NAME)

    0010   ALOG
    0011   NERR3S

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000030 I206      0006   000025 AIN       0004   000062 ANS       0003   000276 C         0003 R 000000 COEF
    0004 R 000000 CPRR      0007   000025 CPTOT     0004   000024 CVIBR     0007   000026 CVTOT     0006   000003 EIN
    0007   000030 GAMA      0007 R 000000 GRRT      0007 R 000012 HHH       0006   000004 HIN       0004 R 000012 HRRT
    0003 R 000226 HZERO     0003   000220 HO        0000 I 000003 I         C000   000016 INJPS     0000 I 000002 J
    0000 I 000001 K         0004   000101 LEWI      0003   000322 NM        0003   000323 NR        0003 I 000322 NSPEC
    0006 R 000000 PIN       0000 R 000000 R         0004   000050 RELXTN    0006 R 000001 RIN       0004   000036 ROTM
    0003   000214 S         0007   000027 SOUND     0003   000240 SUB       0005   000002 THIGH     0006   000002 TIN
    0005   000000 TLOW      0005 R 000001 TMID      0003 R 000310 WMOL      0007   000024 WSUM      0003   000276 XS


00101     1*          SUBROUTINE JANAF(TT)
00103     2*          DIMENSION C(10),HZERO(10)
00104     3*          COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
00104     4*         1NM,NR
00105     5*          COMMON/TRANS1/CPRR(10),HRRT(10),CVIBR(10),ROTM(10),RELXTN(10),
00105     6*         1ANS(15),LEWI(10,10)
00106     7*          COMMON/INPUT3/TLOW,TMID,THIGH
00107     8*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00110     9*          COMMON/JANAF1/GRRT(10),HHH(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
00111    10*          EQUIVALENCE (HZERO,HO),(NM,NSPEC),(C,XS)
00112    11*          DATA R/1.987/
00112    12*      C
00114    13*          K=1                                                              TRAN 132
00115    14*          IF(TT.LE.TMID) K=2                                               TRAN 133
00117    15*          DO 26 J=1,NSPEC                                                  TRAN 134
00122    16*          I=J
00123    17*          CPRR(I)=(((COEF(K,5,J)*TT+COEF(K,4,J))*TT+COEF(K,3,J))*TT+       TRAN 137
00123    18*         1 COEF(K,2,J))*TT+COEF(K,1,J)                                     TRAN 138
00124    19*          HRRT(I) = ((((COEF(K,5,J)/5.)*TT+COEF(K,4,J)/4.)*TT+COEF(K,3,J)/ TRAN 139
```

```
00124     23*          1 3.)*TT+COEF(K,2,J)/2.)*TT+COEF(K,1,J)+COEF(K,0,J)/TT                    TRAN 140
00125     21*          GRRT(J)=COEF(K,1,J)*(1.-ALOG(TT))-(((COEF(K,5,J)*3/5.*TT+COEF(K,4,
00125     22*          1J))*TT/2.+COEF(K,3,J))*TT/3.+COEF(K,2,J))*TT/2.+COEF(K,6,J)/TT
00125     23*          1-COEF(K,7,J)
00126     24*          HHH(I)=HRRT(I)*R*TT-HZERO(I)
00127     25*          HHH(I)=HHH(I)*1.8/R /AMOL(I)*1545.33*32.174
00130     26*          HHH(I)=HHH(I)/PIN*RIN
00131     27*     26 CONTINUE                                                                    TRAN 141
00131     28*     C                                                                              TRAN 142
00133     29*          RETURN
00134   *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00134     30*          END

      END OF COMPILATION:        1 DIAGNOSTICS.
 JANAF            SYMBOLIC          29 NOV 72  11:39:32   0  01526434   14   34  (DELETED)
 JANAF   CODE     RELOCATABLE       29 NOV 72  11:39:32   1  01527370   36    1  (DELETED)
                                                          0  01527434   14   15
```

UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A -(EXEC8 LEVEL E1201OG1DA)

THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:15

-27

SUBROUTINE THERM ENTRY POINT 000434

STORAGE USED: CODE(1) 000454; DATA(0) 000116; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN3	000006
0004	CONR2	000041
0005	INPUT1	000324
0006	TRANS1	000245
0007	INPUT3	000033

EXTERNAL REFERENCES (BLOCK, NAME)

0010	GAMAR
0011	NERR2$
0012	WADU$
0013	WIO2$
0014	SQRT
0015	NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001		000421	10L	0000		000057	100F	0001		000030	101L	0001		000040	102L	0001	000371 103L
0001		000410	104L	0001		000124	147G	0001		000176	157G	0001		000320	217G	0001	000336 225G
0001		000351	235G	0001		000264	26L	0001		000225	28L	0001		000233	29L	0001	000076 30L
0003		000005	AIN	0006		000062	ANS	0004	R	000027	C	0005	R	000000	COEF	0000	R 000034 CONVER
0006	R	000000	CPRR	0000	R	000054	CPTOT	0006		000024	CVIBR	0000	R	000020	E	0003	000003 EIN
0000	R	000035	EOEIN	0000	R	000003	ERR	0000	R	000006	ERRT	0000	R	000052	ETOT	0010	R 000000 GAMAR
0000	R	000040	GAMMA	0003		000004	HIN	0000	R	000056	HOHIN	0006		000012	HRRT	0005	R 000226 HZERO
0005		000226	HO	0004		000000	HI	0004		000013	HINU	0004		000015	HIXI	0004	000003 HI2
0004		000006	HI23	0004		000001	H2	0004		000016	H2NU	0004		000014	H2XI	0004	000004 H23
0004		000002	H3	0004		000020	H3NU	0004		000017	H3XI	0004		000021	H3XINU	0004	000022 H3XIXI
0004		000005	H31	0000	I	000051	I	0000		000100	INJPS	0000	I	000050	J	0000	I 000047 K
0000	I	000044	KIP	0006		000101	LEWI	0000	I	000045	ME	0005		000322	NH	0005	000323 NR
0000	I	000036	NSPEC	0003	R	000000	PIN	0000	R	000033	R	0006		000050	RELXTN	0003	R 000001 RIN
0000	R	000037	RORIN	0006		000036	ROTH	0000	R	000032	RR	0005		000214	S	0000	R 000055 SOUND
0005		000240	SOB	0007		000002	THIGH	0003	R	000002	TIN	0007		000000	TLOW	0007	R 000001 TMID
0000	R	000043	TOTIN	0000	R	000041	TT	0004		000023	UJ	0000	R	000053	UWS	0000	R 000046 UWSA
0004		000007	UI	0004		000010	U2	0004		000011	U3	0004		000012	U4	0005	R 000310 WMOL
0000	R	000000	WSHA	0000	R	000042	WSUM	0005		000276	XS						

```
00101      1*          SUBROUTINE THERM(N,X,Y,STOR)
00101      2*     C
00103      3*          PARAMETER JJ=11
```

```
00104     4*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,XIN
00105     5*          COMMON/COMR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00105     6*         1          H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
00106     7*          DIMENSION WSHA(3),ERR(3)
00107     8*          DIMENSION C(10),HZERO(10),ERRT(10),E(10)
00110     9*          COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),
00110    10*         1NN,NR
00111    11*          COMMON/TRANS1/CFRR(10),HRRT(10),CVIBR(10),RGTM(10),RELXTN(10),
00111    12*         1ANS(15),LEW1(10,10)
00112    13*          COMMON/INPUT3/TLOW,TMID,THIGH
00113    14*          EQUIVALENCE (HZERO,HO),(C,UJ(5))
00114    15*          DATA RR/1.987/,R/1545.33/,CONVER/32.154/
00114    16*    C     DEFINE OTHER THERMODYNAMIC PROPERTIES
00114    17*    C
00120    18*          EOEIN=Y*PIN/RIN
00121    19*          NSPEC=5
00122    20*          RORIN=X*RIN
00123    21*          GAMMA=GAMAR(RORIN,EOEIN)
00123    22*    C
00124    23*          GO TO (101,102,103,104),N
00125    24*      101 STOR=X*TT*1.8/TIN*28.853/WSUM
00126    25*          GO TO 10
00126    26*    C     TEMPERATURE
00127    27*      102 TOTIN=(GAMMA-1.)*EOEIN/R
00130    28*          IF(TOTIN.LT.TIN)TOTIN=TIN
00132    29*          TT=TOTIN/1.6
00133    30*          IF(TOTIN.LT.5*TIN) GO TO 26
00135    31*          KIP=1
00136    32*          ME=1
00137    33*          WSHA(ME)=TT
00140    34*          UWSA=EOEIN/PIN*RIN
00141    35*       30 CONTINUE
00142    36*          TT=WSHA(ME)
00143    37*          K=1
00144    38*          IF(TT.LE.TMID) K=2
00146    39*          DO 91 J=1,NSPEC
00151    40*          I=J
00152    41*          ERRT(I) = ((((COEF(K,5,J)/5.)*TT+COEF(K,4,J)/4.)*TT+COEF(K,3,J)/
00152    42*         1 3.)*TT+COEF(K,2,J)/2.)*TT*COEF(K,1,J)+COEF(K,6,J)/TT-HZERO(I)/RR/
00152    43*         2   TT-1.
00153    44*       91 E(I)=ERRT(I)*TT*1.8/WMOL(I)*1545.33*32.174/PIN*RIN
00155    45*          ETOT=0.
00156    46*          DO 201 I=1,NSPEC
00161    47*      201 ETOT=ETOT+E(I)*C(I)
00163    48*          UWS=ETOT
00164    49*          ERR(ME)=UWSA-UWS
00165    50*          IF(ABS(ERR(ME)/UWSA)-0.01   )26,26,27
00170    51*       27 GO TO (28,29,30),ME
00171    52*       28 ME=2
00172    53*          WSHA(2)=WSHA(1)+100.
00173    54*          GO TO 30
00174    55*       29 TT=WSHA(1)-ERR(1)*(WSHA(2)-WSHA(1))/(ERR(2)-ERR(1))
00175    56*          WSHA(1)=WSHA(2)
00176    57*          ERR(1)=ERR(2)
00177    58*          WSHA(2)=TT
00200    59*          KIP=KIP+1
00201    60*          IF(KIP-20)30,30,31
00204    61*       31 WRITE(6,100)TT
```

```
00207    62*      100  FORMAT(  )
00210    63*       26  CONTINUE
00211    64*           IF(TT.LE.TIN/1.6)TT=TIN/1.6
00213    65*           K=1
00214    66*           IF(TT.LE.TMID) K=2
00216    67*           DO 1 J=1,NSPEC
00221    68*        1  CPRR(J)=(((COEF(K,5,J)*TT+COEF(K,4,J))*TT+COEF(K,3,J))*TT+          TRA
00221    69*          1 COEF(K,2,J))*TT+COEF(K,1,J)
00223    70*           WSUM=0.
00224    71*           DO 331 I=1,NSPEC
00227    72*           WSUM=WSUM+C(I)/WMOL(I)
00230    73*       331 CONTINUE
00232    74*           WSUM=1./WSUM
00233    75*           CPTOT = 0.0
00234    76*      1000 DO 2001 I=1,NSPEC
00237    77*           CPTOT=CPTOT+C(I)*CPRR(I)/WMOL(I)*WSUM
00240    78*      2001 CONTINUE
00242    79*           GAMMA=CPTOT/(CPTOT-1.)
00243    80*           STOR=TT/TIN*1.8
00244    81*           GO TO 10
00244    82*     C     SOUND SPEED
00245    83*       103 SOUND=GAMMA*(GAMMA-1.)*EOEIN
00246    84*           SOUND=ABS(SOUND)
00247    85*           STOR=SQRT(SOUND/PIN*RIN)
00250    86*           GO TO 10
00250    87*     C     ENTHALPY
00251    88*       104 HOMIN=EOEIN*STOR*PIN/RORIN
00252    89*           STOR=HOMIN/PIN*RIN
00253    90*           GO TO 10
00253    91*     C
00254    92*        10 RETURN
00255    93*           END
00255    94*     C
00255    95*     C
```



```
      END OF COMPILATION:        NO  DIAGNOSTICS.
THERM            SYMBOLIC                  15 DEC 72  09:04:24   0  01614010   14    95  (DELETED)
THERM   CODE     RELOCATABLE               15 DEC 72  09:04:24   1  01616472   48     1  (DELETED)
                                                                  0  01616552   14    34
```

```
@ FOR,* STRESS,STRESS                                                    18 DEC 72          0:19:17.949
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A  -(EXEC8 LEVEL E12C10010A)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:18

    SUBROUTINE STRESS     ENTRY POINT 000465

    STORAGE USED: CODE(1) 000510; DATA(0) 000047; BLANK COMMON(2) 000000

    COMMON BLOCKS:

0003   MAIN1   000016
0004   MAIN2   000037
0005   MAIN3   000006
0006   MAIN4   000207
0007   MAIN5   000056
0010   BODY1   000113
0011   SHOCK1  000074
0012   REGIN1  003751
0013   THERM1  003751
0014   STRES1  000005
0015   HEAT1   000002
0016   DIFU1   000026
0017   CONR2   000036
0020   TRAN1   000146
0021   DIFF1   035002

    EXTERNAL REFERENCES (BLOCK, NAME)

0022   HERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0013   001243 A        0004   000000 ACH      0005   000005 AIN      0004   000033 ANGLE    0020 R 000000 API
0020   000001 AP2      0020   000002 AP3      0007   000000 BETA     0010 R 000074 BXI      0010   000055 CURV
0004 R 000013 DNU      0004   000016 DT1      0004   000016 DT2      0004 R 000014 DXI      0016   000000 D1
0016   000013 D2       0005   000003 EIN      0004   000030 ELL      0004   000021 EPS      0004   000024 ERR
0000 R 000012 E11      0000 R 000016 E12      0000 R 000016 E21      0000 R 000013 E22      0000 R 000014 E33
0004   000006 GA       0004   000002 GAMMA    0004   000007 GB       0004   000010 GC       0004   000011 GD
0004   000012 GE       0012 R 000000 HH1      0012 R 001243 HH2      0012   002506 HH3      0005   000004 HIN
0004   000027 HST      0017 R 000000 HI       0017 R 000013 HINU     0017   000015 HIXI     0017 R 000003 HI2
0017   000006 HI23     0017 R 000001 H2       0017 R 000016 H2NU     0017 R 000014 H2XI     0017   000004 H23
0017 R 000002 H3       0017 R 000020 H3NU     0017 R 000017 H3XI     0017 R 000021 H3XINU   0017   000022 H3XIXI
0017   000005 H31      0000 I 000001 II       0000 I 000002 III      0000   000023 INJPS    0003   000006 JA
0003   000015 JC       0003   000010 K        0003   000007 KA       0003 I 000013 LB       0003   000014 LE
0004 R 000035 LEWIS    0003   000000 MA       0003 I 000004 MC       0003   000002 MCM      0003   000011 MI
0003   000001 NA       0003 I 000005 NC       0003 I 000003 NCM      0000 I 000003 ND       0006 R 000017 NU
0003   000012 NI       0013 R 000000 P        0010   000036 PHI      0005   000000 PIN      0014 R 000000 PIII
0014 R 000001 PI12     0014 R 000002 PI21     0014 R 000003 PI22     0014 R 000004 PI33     0004   000004 PR
0011   000055 PSI      0015   000000 Q1       0015   000001 Q2       0004   000003 RE       0005   000001 RIN
0004   000036 RN       0000 R 000000 RR       0006 R 000074 S        0006   000113 SN       0007 R 000001 SQEZ
0006   000132 ST       0004   000005 STAB     0006   000151 STN      0006 R 000170 SXI      0013   002506 T
0004   000034 TIME     0005   000002 TIN      0004   000032 TW       0021 R 000000 U        0017   000023 UJ
0021   016401 UN       0000 R 000004 UNU      0000 R 000006 UOHINU   0000 R 000010 UXI      0004   000001 UO
0017   000007 UI       0017 R 000010 U2       0017 R 000011 U3       0017   000012 U4       0000 R 000005 VNU
```

```
0000 R 000007 VOH2NU    0000 R 000011 VOH2X1    0006   000000 X1        0004   000031 XIMAX     0010   000000 YB
0011   000000 YS        0004   000026 YO        0016   000017 Z0        0011   000017 Z5        0011   000036 Z5Y
0004   000017 Z0
```

```
00101    1*          SUBROUTINE STRESS(N,M)
00101    2*      C
00103    3*          INCLUDE PROC.LIST
00104    3*          REAL NU,LEWIS
00105    3*          PARAMETER NN=45,MM=15,JJ=11
00106    3*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
00107    3*          COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107    3*         1DT2,ZO,YG,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110    3*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    3*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00112    3*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    3*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    3*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PS1(MM)
00115    3*          COMMON/REGION1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116    3*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    3*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120    3*          COMMON/HEAT1/Q1,G2
00121    3*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    3*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    3*         1            H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
00123    3*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124    3*          END
00125    4*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00125    5*      C
00126    6*          RR=((1.-NU(N))*SXI(M)+BXI(M))/S(M)
00127    7*          II=0
00127    8*      C
00130    9*          III=II
00131   10*          IF(N.EQ.2) II=1
00133   11*          ND=N
00134   12*          IF(N.EQ.NC) II=2
00136   13*          IF(N.EQ.NC) N=NCM
00140   14*          UNU=((II-1)*U(N-1,M,2)/U(N-1,M,1)-2*II*U(N,M,2)/U(N,M,1)
00140   15*         1     +(II+1)*U(N+1,M,2)/U(N+1,M,1))/2./DNU
00141   16*          VNU=((II-1)*U(N-1,M,3)/U(N-1,M,1)-2*II*U(N,M,3)/U(N,M,1)
00141   17*         1     +(II+1)*U(N+1,M,3)/U(N+1,M,1))/2./DNU
00142   18*          UOH1NU=((II-1)*U(N-1,M,2)/U(N-1,M,1)/HH1(N-1,M)-2*II*U(N,M,2)/
00142   19*         1     U(N,M,1)/HH1(N,M)+(II+1)*U(N+1,M,2)/U(N+1,M,1)/HH1(N+1,M))/2.
00142   20*         2     /DNU
00143   21*          VOH2NU=((II-1)*U(N-1,M,3)/U(N-1,M,1)/HH2(N-1,M)-2*II*U(N,M,3)/
00143   22*         1     U(N,M,1)/HH2(N,M)+(II+1)*U(N+1,M,3)/U(N+1,M,1)/HH2(N+1,M))/2.
00143   23*         2     /DNU
00144   24*          N=ND
00145   25*          UNU=UNU*SQEZ(N)
00146   26*          VNU=VNU*SQEZ(N)
00147   27*          UOH1NU=UOH1NU*SQEZ(N)
00150   28*          VOH2NU=VOH2NU*SQEZ(N)
00151   29*          II=III
00151   30*      C
00152   31*          III=II
00153   32*          IF(M.EQ.1)III=1
```

```
00155    35*            IF(N.EQ.3)II=-1
00157    34*            IF(M.EQ.NC)II=-1
00161    55*            DXI=((II-1)*U(N,M-1,2)/U(N,M-1,1)-2*II*U(N,M,2)/U(N,M,1)
00161    36*           1     +(II+1)*U(N,M+1,2)/U(N,M+1,1))/2./DXI
00162    37*            VOH2XI=((II-1)*U(N,M-1,3)/U(N,M-1,1)/HH2(N,M-1)-2*II*U(N,M,3)/
00162    38*           1     U(N,M,1)/HH2(N,M)+(II+1)*U(N,M+1,3)/U(N,M+1,1)/HH2(N,M+1))/
00162    39*           2     2./DXI
00163    40*            II=III
00163    41*      C
00164    42*            E11=2.*API*((DXI+RR*UNU)/H1+U3/H12*H1NU*(-1./S(N)))
00165    43*            E22=2.*API*((-1./S(M))*VNU/H2+U2/H12*(H2XI+RR*H2NU))
00166    44*            E33=2.*API*((H3XI+RR*H3NU)/H3/H1+U2*(-1./S(N))*H3NU/H2/H3*U3)
00167    45*            IF(LB.EQ.1.AND.M.EQ.2)E33=2.*API*((DXI+RR*UNU)/H1+U3*H2*(-1./S(M)
00167    46*           1     )*H3XINU/H3XI)
00171    47*            E12=API*(H2/H1*(VOH2XI+RR*VOH2NU)+H1/H2*(-1./S(N))*UOH1NU)
00172    48*            E21=E12
00172    49*      C
00173    50*            PIII=P(N,M)-E11+1./3.*(E11+E22+E33)
00174    51*            PI22=P(N,M)-E22+1./3.*(E11+E22+E33)
00175    52*            PI33=P(N,M)-E33+1./3.*(E11+E22+E33)
00176    53*            PI12=-E12
00177    54*            PI21=-E21
00177    55*      C
00200    56*            RETURN
00201    57*            END
00201    56*      C
00201    59*      C
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437

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      END OF COMPILATION:        NO  DIAGNOSTICS.
STRESS                SYMBOLIC      29 NOV 72  11:39:36   0  01527756   14   59  (DELETED)
STRESS  CODE          RELOCATABLE   29 NOV 72  11:39:36   1  01531450   84    1  (DELETED)
                                                           0  01531574   14   36
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PRINTED IN U.S.A.

FORM 1411-3

SUBROUTINE DIFFUS ENTRY POINT 000364

STORAGE USED: CODE(1) 000327; DATA(0) 000063; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	MAIN1	000016
0004	MAIN2	000037
0005	MAIN3	000006
0006	MAIN4	000207
0007	MAIN5	000056
0010	BODY1	000113
0011	SHOCK1	000074
0012	REGIN1	003751
0013	THERM1	003751
0014	STRES1	000006
0015	HEAT1	000002
0016	DIFU1	000026
0017	CONR2	000036
0020	TRAN1	000146
0021	DIFF1	035002

EXTERNAL REFERENCES (BLOCK, NAME)

0022 HERR35

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000021	131G	0001	000227	165G	0001	000235	174G	0001	000237	177G	0001	000257	207G	
0013	001243	A	0004	000000	ACH	0005	000005	AIN	0004	000033	ANGLE	0020	000000	API	
0020	000001	AP2	0020 R	000002	AP3	0007	000000	BETA	0010	000074	BX1	0010	000055	CURV	
0000 R	000027	DD1	0000 R	000031	DD2	0004 R	000013	DNU	0004	000015	DT1	0004	000016	DT2	
0004 R	000014	DX1	0016 R	000000	D1	0016 R	000013	D2	0005	000003	EIN	0004	00003D	ELL	
0004	000021	EPS	0004	000024	ERR	0004	000006	GA	0004	000002	GAMMA	0004	000007	GB	
0004	000010	GC	0004	000011	GD	0004	000012	GE	0012	000000	HH1	0012	001243	HH2	
0012	002506	HH3	0005	000004	HIN	0004	000027	HST	0017 R	000000	HI	0017	000013	HINU	
0017	000015	H1X1	0017	000003	H12	0017	000006	H123	0017 R	000001	H2	0017	000016	H2NU	
0017	000014	H2X1	0017	000004	H23	0017	000002	H3	0017	00002D	H3NU	0017	000017	H3X1	
0017	000021	H3XINU	0017	000022	H3X1X1	0017	000005	H31	0000 I	000032	I	0000 I	000024	II	
0000 I	000026	III	0000	000037	INJPS	0000 I	000025	J	0003	000006	JA	0003 I	000015	JC	
0003	000010	K	0003	000007	KA	0003	000013	LB	0003	000014	LE	0004 R	000035	LEWIS	
0003	000000	MA	0003 I	000004	MC	0003	000002	MCM	0003	000011	MI	0003	000001	NA	
0003 I	000005	NC	0003 I	000003	NCM	0000 I	000030	ND	0006 R	000017	NU	0003	000012	NI	
0013	000000	P	0010	000036	PHI	0005	000000	PIN	0014	000000	PI11	0014	000001	PI12	
0014	000002	PI21	0014	000003	PI22	0014	000004	PI33	0004	000004	PR	0011	000055	PSI	
0015	000000	Q1	0015	000001	Q2	0004	000003	RE	0005	000001	RIN	0004	000036	RN	
0006 R	000074	S	0006	000113	SN	0007 R	000001	SQE2	0006	000132	ST	0004	000005	STAB	
0006	000151	STN	000C R	000000	SUM1	000C R	000012	SUM2	0006 R	00017D	SX1	0013	002506	T	
0004	000034	TIME	0005	000002	TIN	0004	000032	TM	0021 R	000000	U	0017	000023	UJ	
0021	016401	UN	0004	000001	UO	0017	000007	U1	0017	000010	U2	0017	000011	U3	

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      0017  000012 U4        0006   000000 XI        0004   000031 XIMAX     001C   000000 YB        0011   000000 YS
      0004  000020 YC        001D   000017 ZB        0011   000017 ZS        0011   000036 ZSY       0004   000017 ZD
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```
      0001      1*            SUBROUTINE DIFFUS(N,M)
      0003      2*            INCLUDE PROC,LIST
      0004      2*            REAL NU,LEWIS
      0005      2*            PARAMETER NN=45,MM=15,JJ=11
      0006      2*            COMMON/MAIN1/MA,NA,NCM,NCN,MC,NC,JA,KA,K,MI,NI,LB,LE,JC
      0007      2*            COMMON/MAIN2/ACM,UC,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
     1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TM,ANGLE,TIME,LEWIS,RN
      0010      2*            COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
      0011      2*            COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
      0012      2*            COMMON/MAIN5/BETA,SQEZ(NN)
      0013      2*            COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
      0014      2*            COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
      0015      2*            COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
      0016      2*            COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
      0017      2*            COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
      0020      2*            COMMON/HEAT1/Q1,Q2
      0021      2*            COMMON/DIFU1/D1(JJ),D2(JJ)
      0022      2*            COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
      0022      2*           1              H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
      0023      2*            COMMON/TRAN1/AP1,AP2,AP3(10,10)
      0024      2*            END
      0025      3*            COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
      0026      4*            DIMENSION SUM1(10),SUM2(10)
      0026      5*      C
      0027      6*            II=0
      0030      7*            DO 1 J=5,JC
      0033      8*            III=II
      0034      9*            IF(M.EQ.1)II=1
      0036     10*            IF(M.EQ.3)II=-1
      0040     11*            IF(M.EQ.MC) II=-1
      0042     12*            DD1=((III-1)*U(N,M-1,J)/U(N,M-1,1)-2*II*U(N,M,J)/U(N,M,1)+(II+1)*
      0042     13*           1       U(N,M+1,J)/U(N,M+1,1))/2./DXI
      0043     14*            II=III
      0043     15*      C
      0044     16*            III=II
      0045     17*            ND=N
      0046     18*            IF(N.EQ.NC) II=2
      0050     19*            IF(N.EQ.NC) N=NCM
      0052     20*            IF(N.EQ.2) II=1
      0054     21*            DD2=((III-1)*U(N-1,M,J)/U(N-1,M,1)-2*II*U(N,M,J)/U(N,M,1)+(II+1)*
      0054     22*           1       U(N+1,M,J)/U(N+1,M,1))/2./DNU
      0055     23*            N=ND
      0056     24*            II=III
      0057     25*            DD2=DD2*SQEZ(N)
      0057     26*      C
      0060     27*            D1(J-4)=(DD1+(1.-NU(N))*SXI(M)/S(M)*DD2)/H1
      0061     28*            D2(J-4)=DD2*(-1.)/S(M)/H2
      0061     29*      C
      0062     30*          1 CONTINUE
      0062     31*      C
      0064     32*            DO 2 I=5,JC
      0067     33*            SUM1(I-4)=0.
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00170    34*            SUM2(I-4)=0.
00171    35*       2    CONTINUE
00171    36*       C
00173    37*            DO 3 I=5,JC
00176    38*            DO 3 J=5,JC
00201    39*            SUM1(I-4)=SUM1(I-4)-AP3(I-4,J-4)*D1(J-4)
00202    40*            SUM2(I-4)=SUM2(I-4)-AP3(I-4,J-4)*D1(J-4)
00203    41*       3    CONTINUE
00203    42*       C
00206    43*            DO 4 J=5,JC
00211    44*            D1(J-4)=SUM1(J-4)
00212    45*            D2(J-4)=SUM2(J-4)
00213    46*       4    CONTINUE
00213    47*       C
00213    48*       C
00215    49*            RETURN
00216    50*            END
00216    51*       C
00216    52*       C

      END OF COMPILATION:       NO  DIAGNOSTICS.
DIFFUS            SYMBOLIC      29 NOV 72  11:39:38   0  01532564   14   52  (DELETED)
DIFFUS  CODE      RELOCATABLE   29 NOV 72  11:39:38   1  01534114   84    1  (DELETED)
                                                      0  01534240   14   23
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@ FOR,O HEAT,HEAT                                                    16 DEC 72          0:19:23.442
UNIVAC 1106 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E120100CA)
THIS COMPILATION WAS DONE ON 16 DEC 72 AT 00:19:23

SUBROUTINE HEAT       ENTRY POINT 000227

STORAGE USED: CODE(1) 000247; DATA(0) 000027; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003  MAIN1  000016
0004  MAIN2  000037
0005  MAIN3  000006
0006  MAIN4  000207
0007  MAIN5  000056
0010  BODY1  000113
0011  SHOCK1 000074
0012  REGIN1 003751
0013  THERM1 003751
0014  STRES1 000005
0015  HEAT1  000002
0016  DIFU1  000026
0017  CONR2  000036
0020  TRAN1  000146
0021  DIFF1  035002
0022  JANAF1 000031

EXTERNAL REFERENCES (BLOCK, NAME)

0023  MERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001  000176 1636    0013  001243 A       0004  000000 ACH     0005  000005 AIN     0004  000033 ANGLE
0020  000000 AP1     0020 R 000001 AP2     0020  000002 AP3     0007  000000 BETA    0010  000074 BX1
0022  000025 CPTU1   0010  000055 CURV      0022  000026 CVTUT   0004 R 000013 DNU     0004  000015 DT1
0004  000016 DT2     0004 R 000014 DX1     0016 R 000000 D1      0016 R 000013 D2      0005  000003 EIN
0004  000030 ELL     0004  000021 EPS      0004  000024 ERR     0004  000006 GA      0022  000030 GAMA
0004  000002 GAMMA   0004  000007 GB       0004  000010 GC      0004  000011 GD      0004  000012 GE
0022  000000 GRRT    0022 R 000012 HHH     0012  000000 HH1     0012  001243 HH2     0012  002506 HH3
000C R 000000 H1     0005  000004 HIN      0004  000027 HST     0017 R 000000 H1      0017  000013 H1NU
0017  000015 H1X1    0017  000003 H12      0017  000006 H123    0017 R 000001 H2      0017  000016 H2NU
0017  000014 H2X1    0017  000004 H23      0017  000002 H3      0017  000020 H3NU    0017  000017 H3X1
0017  000021 H3X1NU  0017  000022 H3X1X1   0017  000005 H31     0000 I 000002 II      0000 I 000003 III
0000  000013 INJPS   000C I 000007 J       0003  000006 JA      0003 I 000015 JC      0003  000010 K
0003  000007 KA      0003  000013 LB       0003  000014 LE      0004 R 000035 LEWIS    0003  000000 MA
0003 I 000004 MC     0003  000002 MCM      0003  000011 M1      0003  000001 NA      0003 I 000005 NC
0003 I 000003 NCM    0000 I 000005 NC      0006 R 000017 NU      0003  000012 N1      0013  000000 P
0010  000036 PH1     0005  000000 PIN      0014  000000 PI11    0014  000001 PI12    0014  000002 PI21
0014  000003 P122    0014  000004 P133     0004  000004 PR      0011  000055 PSI     0000 R 000004 QQ1
0000 R 000006 QQ2    0015 R 000000 Q1      0015 R 000001 Q2      0004  000003 RE      0005  000001 RIN
0004  000036 RN      0006 R 000074 S       0006  000113 SN      0022  000027 SOUND   0007 R 000001 SQEZ
0006  000132 ST      0004  000005 STA6     0006  000151 STN     0006 R 000170 SX1     0013 R 002506 T
0004  000034 TIME    0005  000002 TIN      0004  000032 TR      0021  000000 U       0017  000023 UU
```

```
0021  016401 0A     0004  000001 A0     0017  000007 A1     0017  000010 A2     0017  000011 A3
0017  000012 A4     0022  000024 ASUM   0006  000000 B1     0004  000031 BIMAX  0010  000000 YB
0011  000000 YS     0004  000020 Y0     0010  000017 ZB     0011  000017 ZS     0011  000036 ZSY
0004  000017 ZC
```

```
00101   1*          SUBROUTINE HEAT(N,M)
00101   2*    C
00103   3*          INCLUDE PROC,LIST
00104   3*          REAL NU,LEWIS
00105   3*          PARAMETER NN=45,MM=15,JJ=11
00106   3*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,MI,NI,LB,LE,JC
00107   3*          COMMON/MAIN2/ACH,U0,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107   3*         1DT2,Z0,Y0,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110   3*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111   3*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SXI(MM)
00112   3*          COMMON/MAIN5/BETA,SQEZ(NN)
00113   3*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114   3*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115   3*          COMMON/REGIN1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116   3*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117   3*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120   3*          COMMON/HEAT1/Q1,Q2
00121   3*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122   3*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2X1,H1X1,
00122   3*         1              H2NU,H3X1,H3NU,H3X1NU,H3X1X1,UJ(JJ)
00123   3*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124   3*          END
00125   4*          DIMENSION HI(2)
00126   5*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00127   6*          COMMON/JANAF1/GRRT(10),HHH(10),#SUM,CPTOT,CVTOT,SOUND,GAMA
00127   7*    C
00130   8*          II=0
00130   9*    C
00131  10*          III=II
00132  11*          IF(M.EQ.1)II=1
00134  12*          IF(M.EQ.3)II=-1
00136  13*          IF(M.EQ.MC)II=-1
00140  14*          QQ1=(((II-1)*T(N,M-1)-2.*II*T(N,M)+(II+1)*T(N,M+1))/2./DX1
00141  15*          II=III
00141  16*    C
00142  17*          III=II
00143  18*          ND=N
00144  19*          IF(N.EQ.NC) II=2
00146  20*          IF(N.EQ.NC) N=NCM
00150  21*          IF(N.EQ.2) II=1
00152  22*          QQ2=(((II-1)*T(N-1,M)-2.*II*T(N,M)+(II+1)*T(N+1,M))/2./DNU
00153  23*          N=ND
00154  24*          QQ2=QQ2*SQEZ(N)
00155  25*          II=III
00155  26*    C
00156  27*          Q2=-AP2*QQ2*(-1.)/S(M)/H2
00157  28*          Q1=-AP2*(QQ1+(1.-NU(N))*SXI(M)/S(M)*QQ2)/H1
00157  29*    C
00160  30*          HI(1)=0.
00161  31*          HI(2)=0.
```

```
00162    32*            DO 2 J=5,JC
00165    33*            HI(1)=HI(1)+HHH(J-4)*D1(J-4)
00166    34*            HI(2)=HI(2)+HHH(J-4)*D2(J-4)
00167    35*          2 CONTINUE
00171    36*            G1=G1+HI(1)
00172    37*            G2=G2+HI(2)
00172    38*      C
00172    39*      C
00173    40*            RETURN
00174    41*            END
00174    42*      C
00174    43*      C
```

END OF COMPILATION: NO DIAGNOSTICS.

HEAT		SYMBOLIC	29 NOV 72	11:39:40	0	01534742	14	43 (DELETED)
HEAT	CODE	RELOCATABLE	29 NOV 72	11:39:40	1	01536074	84	1 (DELETED)
					0	01536220	14	18

```
@ FOR,* WALL,WALL                                                    18 DEC 72          0:19:26. 86
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A  -(EXECB LEVEL E1201001DA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:26

    SUBROUTINE WALL      ENTRY POINT 000153

    STORAGE USED: CODE(1) 000171; DATA(0) 000037; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003  MAIN1  000016
    0004  MAIN2  000037
    0005  MAIN3  000006
    0006  MAIN4  000207
    0007  MAIN5  000056
    0010  BODY1  000113
    0011  SHOCK1  000070
    0012  REGIN1  003751
    0013  THERM1  003751
    0014  STRES1  000006
    0015  HEAT1  000002
    0016  DIFU1  000026
    0017  CONR2  000036
    0020  TRAN1  000146
    0021  DIFF1  035002
    0022  CONTRL 000004

    EXTERNAL REFERENCES (BLOCK, NAME)

    0023  NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001  000121 1L      0001  000024 1316    0001  000101 144G    0013  001243 A       0004  000000 ACH
    0005  000005 AIN     0004  000033 ANGLE   0020  000000 AP1     0020  000001 AP2     0020  000002 AP3
    0007  000000 BETA    0010  000074 BX1     0022 L 000003 CATAL   0010  000055 CURV    0004  000013 DNU
    0004  000015 DT1     0004  000016 DT2     0004  000014 DX1     0016  000000 D1      0016  000013 D2
    0005 R 000003 EIN    0004  000030 ELL     0004  000021 EPS     0004  000024 ERR     0022 L 000000 FROZN
    0004  000006 GA      0004  000002 GAMMA   0004  000007 GB      0004  000010 GC      0004  000011 GD
    0004  000012 GE      0012  000000 HH1     0012  001243 HH2     0012  002506 HH3     0005  000004 HIN
    0004  000027 HST     0017  000000 H1      0017  000013 H1NU    0017  000015 H1X1    0017  000003 H12
    0017  000006 H123    0017  000001 H2      0017  000016 H2NU    0017  000014 H2X1    0017  000004 H23
    0017  000002 H3      0017  000020 H3NU    0017  000017 H3X1    0017  000021 H3X1NU  0017  000022 H3X1X1
    0017  000005 H31     0000  000005 INJPS   0022 L 000002 ISOTH   0000 I 000001 J       0003  000006 JA
    0003 I 000015 JL     0003  000010 K       0003  000007 KA      0003  000013 LB      0003  000014 LE
    0004 R 000035 LEWIS  0000 I 000000 M     0003  000000 MA      0003 I 000004 MC      0003  000002 MCM
    0003  000011 M1      0003  000001 NA      0003 I 000005 NC      0003 I 000003 NCM     0006 R 000017 NU
    0003  000012 N1      0013  000000 P       0010  000036 PHI     0005 R 000000 PIN     0014  000000 PI11
    0014  000001 PI12    0014  000002 PI21    0014  000003 PI22    0014  000004 PI33    0004  000004 PR
    0011  000055 PSI     0015  000000 Q1      0015  000001 Q2      0004 R 000003 RE      0005 R 000001 RIN
    0004  000036 RN      0006  000074 S       0022 L 000001 SIMPL   0006  000113 SN      0007  000001 SQEZ
    0006  000132 ST      0004  000005 STAB    0006  000151 STN     0006  000170 SX1     0013  002506 T
    0004  000034 TIME    0005  000002 TIN     0004 R 000032 TW      0021  000000 U       0017  000023 UJ
    0021 R 016401 UN      0004  000001 UO      0017  000007 U1      0017  000010 U2      0017  000011 U3
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```
0017  000012 U4      0006  000000 XI      0004  000031 XIMAX   0010  000000 YB      0011  000000 YS
0004  000020 YD      0010  000017 ZB      0011  000017 ZS      0011  000036 ZSY     0004  000017 ZD
```

```
00101    1*          SUBROUTINE WALL
00101    2*      C
00103    3*          INCLUDE PROC,LIST
00104    3*          REAL NU,LEWIS
00105    3*          PARAMETER NN=45,MM=15,JJ=11
00106    3*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
00107    3*          COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107    3*         1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110    3*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111    3*          COMMON/MAIN4/XI(MM),NU(NN),S(MM),SN(MM),ST(MM),STN(MM),SAI(MM)
00112    3*          COMMON/MAIN5/BETA,SQEZ(NN)
00113    3*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),BXI(MM)
00114    3*          COMMON/SHOCK1/YS(MM),ZS(MM),ZSY(MM),PSI(MM)
00115    3*          COMMON/REGION1/HH1(NN,MM),HH2(NN,MM),HH3(NN,MM)
00116    3*          COMMON/THERM1/P(NN,MM),A(NN,MM),T(NN,MM)
00117    3*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120    3*          COMMON/HEAT1/Q1,Q2
00121    3*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122    3*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2XI,H1XI,
00122    3*         1             H2NU,H3XI,H3NU,H3XINU,H3XIXI,UJ(JJ)
00123    3*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124    3*          END
00125    4*          COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00126    5*          LOGICAL FROZN,SIMPL,ISOTH,CATAL
00127    6*          COMMON/CONTRL/FROZN,SIMPL,ISOTH,CATAL
00130    7*          DO 2 M=2,ML
00130    8*      C
00133    9*          IF(RE.GT.1.E8) GO TO 1
00135   10*          UN(NC,M,2)=0.
00136   11*          UN(NC,M,3)=0.
00137   12*          IF(.NOT.ISOTH)UN(NC,M,4)=UN(NC,M,1)*(UN(NCM,M,4)/UN(NCM,M,1)-0.5*(
00137   13*         1          UN(NCM,M,2)**2+UN(NCM,M,3)**2)/UN(NCM,M,1)**2)
00141   14*          IF(ISOTH)UN(NC,M,4)=UN(NC,M,1)*TW*EIN/PIN*RIN
00141   15*      C
00141   16*      C
00141   17*      C   BODY CATALYTICITY
00143   18*          DO 3 J=5,JC
00146   19*          IF(CATAL)UN(NC,M,J)=UN(2,M,J)/UN(2,M,1)*UN(NC,M,1)
00150   20*          IF(.NOT.CATAL)UN(NC,M,J)=UN(NCM,M,J)/UN(NCM,M,1)*UN(NC,M,1)
00152   21*        3 CONTINUE
00154   22*        1 CONTINUE
00155   23*          UN(NC,M,3)=0.
00156   24*        2 CONTINUE
00156   25*      C
00160   26*          RETURN
00161   27*          END
00161   28*      C
00161   29*      C
```

```
      END OF COMPILATION:        NO  DIAGNOSTICS.
WALL            SYMBOLIC                    29 NOV 72  11:39:42   0  01536614   14   29  (DELETED)
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```
@ FOR,* DISSS,DISSS                                                    18 DEC 72          0:19:27.950
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E1201UC1CA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:26

SUBROUTINE DISSS      ENTRY POINT 001034

STORAGE USED: CODE(1) 001053; DATA(0) 000136; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003   MAIN2   000037
0004   MAIN3   000000
0005   INPUT1  000324
0006   JANAF1  000031
0007   INPUR1  000324
0010   DISS1   000013

EXTERNAL REFERENCES (BLOCK, NAME)

0011   SQRT
0012   EXP
0013   NERR2$
0014   NEXP6$
0015   NERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001   000671 1001L    0001   000122 1111L    0000   000065 116F     0001   000041 125G     0001   000050 133G
0001   000053 140G     0001   000214 2222L    0001   000673 264G     0001   000750 3001L    0001   000761 306G
0001   001002 317G     0001   001302 3333L    0001   000411 4444L    0001   000475 5555L    0001   000563 6666L
0007 R 000026 A        0003   000000 ACH      0004   000005 AIN      0000 R 000045 AKP      0000 R 000043 AKPDUM
0003   000033 ANGLE    0005 R 001310 ATMT     0007 R 000052 B        0005   000000 COEF     0007   000026 COEFA
0007   000052 COEFB    0006   000025 CPTOT    0006   000026 CVTOT    0003   000013 DNU      0010   000012 DT
0003   000015 DT1      0003   000016 DT2      0003   000014 DX1      0004   000003 EIN      0003   000030 ELL
0003   000021 EPS      0003   000024 ERR      0007 R 000002 ETA      0000 R 000047 FA       0000 R 000051 FB
0000 R 000053 FC       0000 R 000055 FD       0000 R 000061 FE       0007   000122 FRACT    0006 R 000000 G
0003   000006 GA       0006   000030 GAMA     0003   000002 GAMMA    0000 R 000026 GAS1     0000 R 000027 GAS2
0003   000007 GB       0003   000010 GC       0003   000011 GD       0003   000012 GE       0006   000000 GRRT
0000 R 000036 G1       0000 R 000037 G2       0006   000012 HHH      0004   000004 HIN      0003   000027 HST
0005   000226 HO       0000 I 001034 I        0000   001100 INJPS    0007 I 000134 IPR      0000 I 000046 IPR1
0000 I 001041 IPR101    0000 I 001056 IPR2     0000 I 001042 IPR201    0000 I 000062 IPR3     0000 I 000052 IPR4
0000 I 001054 IPR5      0000 I 001066 IPR6     0007 I 001076 ITYPE     0000 I 001044 ITYPED    0000 I 000040 II
0000 I 001063 JJ        0000 I 001035 JREACT    0003   001035 LEWIS    0005   000322 NM       0005   000323 NR
0007 I 001001 NREACT    0000 I 001064 NS       0007 I 001000 NSPEC     0004 R 000000 PIN      0003   000004 PR
0005   000214 W         0003   001003 RE       0000 R 000030 RHO       0000 R 000031 RHO2     0000 R 000032 RHO3
0004 R 000001 RIN       0003 R 001036 RN       0006   000027 SOUND    0003   000005 STAB     0005   000240 SUB
0000 D 000000 SUM       0000 R 001033 T        0003   001034 TIME     0004 R 000002 TIN      0003   000032 TW
0003   000001 UG        0000 R 001014 WEAK     0000 R 000002 WFOR      0005   000310 WMOL     0006 R 000024 WSUM
0000 R 000057 WWBAR     0000 R 001056 WWFOR    0010 R 001000 WWW       0003   000031 XIMAX    0005   000276 XS
0003   000020 YO        0003   001017 ZO
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00101     1*          SUBROUTINE DISSS(RHOO,TT,DISS)
00103     2*          DOUBLE PRECISION SUM
00104     3*          COMMON/MAIN2/ACH,CO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00104     4*         1DT2,ZC,YC,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00105     5*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00106     6*          DIMENSION DISS(10),WFOR(10),WBAK(10),A(20),B(20),G(10),ATWT(10)
00107     7*          COMMON/INPUT1/COEF(2,7,10),G(10),HC(10),SUB(10,3),XS(10),WMOL(10),
00107     8*         1NN,NR
00110     9*          COMMON/JANAF1/GRRT(10),HHH(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
00111    10*          COMMON/INPUT1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
00111    11*         1FRACT(10),IPR(20,6)
00112    12*          COMMON/DISS1/WWW(10),DT
00113    13*          EQUIVALENCE (A,COEFA),(B,COEFB),(G,GRRT),(ATWT,WMOL)
00114    14*          DATA GAS1/82.07835/,GAS2/1.987/
00117    15*      116 FORMAT(1H ,10X,10(A6,5X))
00120    16*          RHO = RHOO* 32.2*454. / (12.*2.54)**3. * RIN
00121    17*          RHO2=RHO * RHO
00122    18*          RHO3=RHO2 * RHO
00123    19*          T=TT*TIN/1.8
00124    20*          DO 4001 I=1,NSPEC
00127    21*          WFOR(I)= 0.0
00130    22*     4001 WBAK(I)= 0.0
00132    23*          DO 2001 JREACT=1,NREACT
00135    24*          G1 = 0.0
00136    25*          G2 = 0.0
00137    26*          DO 11 II=1,3
00142    27*          IPR1D1=IPR(JREACT,II)
00143    28*          IPR2D1=IPR(JREACT,II+3)
00144    29*          IF(IPR1D1.NE. 0) G1=G(IPR1D1) + G1
00146    30*          IF(IPR2D1 .NE. 0) G2=G(IPR2D1)  + G2
00150    31*       11 CONTINUE
00152    32*          AKPDUM=EXP(G1-G2)
00153    33*           ITYPED=ITYPE(JREACT)
00154    34*          GO TO(1111,2222,3333,4444,5555,6666),ITYPED
00155    35*    1111 AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
00156    36*          IPR1=IPR(JREACT,1)
00157    37*          FA = DISS(IPR1)/ATWT(IPR1)
00160    38*          IPR2=IPR(JREACT,2)
00161    39*          FB = DISS(IPR2)/ATWT(IPR2)
00162    40*          IPR4=IPR(JREACT,4)
00163    41*          FC = DISS(IPR4)/ATWT(IPR4)
00164    42*          IPR5=IPR(JREACT,5)
00165    43*          FD = DISS(IPR5)/ATWT(IPR5)
00166    44*          WWFOR = AKF * RHO2 * FA * FB
00167    45*          WWBAK = AKF * RHO2 * FC * FD / AKPDUM
00170    46*          GO TO 1001
00171    47*    2222 AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
00172    48*          IPR1=IPR(JREACT,1)
00173    49*          FA = DISS(IPR1)/ATWT(IPR1)
00174    50*          IPR2=IPR(JREACT,2)
00175    51*          FB = DISS(IPR2)/ATWT(IPR2)
00176    52*          IPR4=IPR(JREACT,4)
00177    53*          FC=DISS(IPR4)/ATWT(IPR4)
00200    54*          WWFOR = RHO3 * FA * FB * AKF / WSUM
00201    55*          WWBAK = RHO2 * AKF / WSUM/ AKPDUM / GAS1 / T * FC
00202    56*          GO TO 1001
00203    57*    3333 AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
00204    58*          IPR1=IPR(JREACT,1)
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00205   59*           FA = DISS(IPR1)/ATWT(IPR1)
00206   60*           IPR2=IPR(JREACT,2)
00207   61*           FB = DISS(IPR2)/ATWT(IPR2)
00210   62*           IPR4 = IPR(JREACT,4)
00211   63*           FC = DISS(IPR4)/ATWT(IPR4)
00212   64*           IPR5=IPR(JREACT,5)
00213   65*           FD = DISS(IPR5)/ATWT(IPR5)
00214   66*           IPR6 = IPR(JREACT,6)
00215   67*           FE = DISS(IPR6)/ATWT(IPR6)
00216   68*           WWFOR = RHO2 * AKF * FA * FB
00217   69*           WWBAK = RHO3 * AKF * FC * FD * FE * GAS1 * T / AKPDUM
00220   70*           GO TO 1001
00221   71*     4444  AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
00222   72*           IPR1=IPR(JREACT,1)
00223   73*           FA = DISS(IPR1)/ATWT(IPR1)
00224   74*           IPR2=IPR(JREACT,2)
00225   75*           FB = DISS(IPR2)/ATWT(IPR2)
00226   76*           IPR4 = IPR(JREACT,4)
00227   77*           FC = DISS(IPR4)/ATWT(IPR4)
00230   78*           WWFOR = RHO2 * AKF * FA * FB
00231   79*           WWBAK = RHO * AKF * FC / GAS1 / T / AKPDUM
00232   80*           GO TO 1001
00233   81*     5555  AKF= A(JREACT) * T**ETA(JREACT) * EXP(-B(JREACT)/T )
00234   82*           IPR1=IPR(JREACT,1)
00235   83*           FA = DISS(IPR1)/ATWT(IPR1)
00236   84*           IPR4=IPR(JREACT,4)
00237   85*           FB = DISS(IPR4)/ATWT(IPR4)
00240   86*           IPR5=IPR(JREACT,5)
00241   87*           FC = DISS(IPR5)/ATWT(IPR5)
00242   88*           WWFOR = RHO2 * AKF * FA / WSUM
00243   89*           WWBAK = RHO3 * AKF * FB * FC * GAS1 * T / AKPDUM / WSUM
00244   90*           GO TO 1001
00245   91*     6666  AKF=A(JREACT)*T**ETA(JREACT)*EXP(-B(JREACT)/T)
00246   92*           IPR1=IPR(JREACT,1)
00247   93*           FA = DISS(IPR1)/ATWT(IPR1)
00250   94*           IPR2=IPR(JREACT,2)
00251   95*           FB = DISS(IPR2)/ATWT(IPR2)
00252   96*           IPR3=IPR(JREACT,3)
00253   97*           FC = DISS(IPR3)/ATWT(IPR3)
00254   98*           IPR4=IPR(JREACT,4)
00255   99*           FD = DISS(IPR4)/ATWT(IPR4)
00256  100*           IPR5=IPR(JREACT,5)
00257  101*           FE = DISS(IPR5)/ATWT(IPR5)
00260  102*           WWFOR=RHO3*AKF*FA*FB*FC*GAS1*T/AKPDUM
00261  103*           WWBAK=RHO2*AKF*FD*FE
00262  104*     1001  CONTINUE
00263  105*           DO 3001 I=1,6
00266  106*           JJ= IPR(JREACT,I)
00267  107*           IF (JJ .EQ. 0) GO TO 3001
00271  108*           IF (I .GE.4) WFOR(JJ)= WFOR(JJ)+ WWFOR
00273  109*           IF (I .GE.4) WBAK(JJ)= WBAK(JJ)+ WWBAK
00275  110*           IF (I .LE. 3) WFOR(JJ)= WFOR(JJ) + WWBAK
00277  111*           IF (I .LE. 3) WBAK(JJ)= WBAK(JJ) + WWFOR
00301  112*     3001  CONTINUE
00303  113*     2001  CONTINUE
00305  114*           DO 5001 I=1,NSPEC
00310  115*           WW(I)=(WFOR(I)-WBAK(I))*ATWT(I)/RHO*SQRT(RIN/PIN)
00311  116*           WW(I)=RN*WW(I)
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00312    117*     5001 CONTINUE
00312    118*  C
00314    119*        NS=NSPEC-1
00315    120*        SUM=C.
00316    121*        DO 1 I=1,NS
00321    122*     1  SUM=SUM+WW(I)
00323    123*        WW(NSPEC)=-SUM
00324    124*        RETURN
00325    125*        END
00325    126*  C
00325    127*  C
```

END OF COMPILATION: NO DIAGNOSTICS.

DISSS		SYMBOLIC	29 NOV 72	11:39:44	0	01540072	14	127 (DELETED)
DISSS	CODE	RELOCATABLE	29 NOV 72	11:39:44	1	01543454	48	1 (DELETED)
					0	01543534	14	61

UNIVAC 1108 FORTRAN V EXEC II LEVEL 29A -(EXECB LEVEL E12D1GG1CA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:31

SUBROUTINE TRANSF ENTRY POINT 002042

STORAGE USED: CODE(1) 002066; DATA(0) 000624; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003	CONTRL	000001
0004	MAIN3	000006
0005	DOUBLE	000171
0006	INPUT1	000324
0007	INPUT2	003524
0010	SORT1	000454
0011	TRANS1	000245
0012	INTERP	000124

EXTERNAL REFERENCES (BLOCK, NAME)

0013	SORT1
0014	GAUSS
0015	GJR
0016	SQRT
0017	MPOUS
0020	NIO2S
0021	MPNLS
0022	NERR3S

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	002007 1C5L	0001	000046 146G	0001	000053 153G	0001	000101 160G	0001	000133 167G		
0001	000161 172G	0001	000171 201G	0001	000275 222G	0001	000302 227G	0001	000303 232G		
0001	000331 242G	0001	000335 246G	0001	000246 27L	0001	000376 272G	0001	000411 277G		
0001	000227 29L	0001	000220 30L	0001	000457 302G	0001	000467 311G	0001	000611 332G		
0001	000366 34L	0001	000622 340G	0001	000635 345G	0001	000653 355G	0001	000705 363G		
0000	000231 37F	0001	000571 40L	0001	001023 404G	0001	001024 407G	0001	001041 416G		
0001	000541 42L	0001	001044 422G	0001	000532 43L	0001	001062 431G	0001	001101 434G		
0001	001134 445G	0001	001135 450G	0001	001163 460G	0001	001207 463G	0001	001212 466G		
0001	001234 472G	0001	001340 516G	0001	001370 524G	0001	001371 527G	0001	000761 53L		
0001	001403 535G	0001	000726 54L	0001	001413 543G	0001	001430 546G	0001	001454 556G		
0001	001460 562G	0001	001521 606G	0001	001542 614G	0001	001546 620G	0001	001564 627G		
0001	001631 642G	0001	001652 645G	0001	001673 655G	0001	001760 673G	0001	001761 676G		
0001	001300 68L	0001	001511 7DL	0000	000276 73F	0001	001527 91L	0004	000005 AIN		
0011 R	000062 ANS	0012 R	000121 ANSR	0010 R	000144 ASTAR	0000 R	000203 AVGDRO	0000 R	000204 BOLTZ		
0010 R	000316 BSTAR	0000 R	000012 CHECK	0006	000000 COEF	0000 R	000212 CONST	0011 R	000071 CPEQ		
0011 R	000070 CPFROZ	0011 R	000077 CPREAC	0011 R	000000 CPRR	0011 R	000024 CVIBR	0000 R	000000 DELH		
0011 R	000076 DENSTY	0004	000003 EIN	0011 R	000100 ENTLPY	0011 R	000067 EQCON	0000	000346 EQL		
0000	000346 EQLB	0000 R	000347 ETA	0003 L	000000 FROZN	0011 R	000065 FRZCON	0005 R	000000 G		
0000 R	000024 GMAT	0004	000004 HIN	0011 R	000012 HRRT	0006	000226 HO	0000 I	000213 I		
0005 I	000170 IMAT	0000	000551 INJPS	0011 R	000064 INTCON	0000 I	000214 J	0000 I	000220 JJ		
0000 I	000216 K	0000 I	000217 L	0011 R	000101 LEWI	0011 R	000074 LEWIS	0000 I	000221 LL		
0000	000224 MATRX	0011 R	000063 MONCON	0006 I	000322 NM	0000 I	000207 NMM	0006 I	000323 NR		

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0007   000500 NTAB     0012   000120 NTP      0007   003454 NTT      0010 R 000000 OMEGA     0000 R 000202 PI
0004 R 000000 PIN      0000 R 000211 PP       0011 R 000073 PREW     0011 R 000072 PRFROZ    0006   000214 Q
0000 R 000200 R        0011 R 000066 REACON   0011 I 000050 RELATN   0004   000001 RIN       0011 R 000036 ROTM
0007   003270 ROTNM    0000 R 000205 RPVT     0010 R 000000 RTPD     0007 I 003546 SPECE     0007 I 003100 SPECIE
0007 R 003302 STC      0010 R 000310 STXS     0006 I 000240 SUB      0000 R 000215 SUM       0007   000620 TABLES
0007   000000 TEM      0004 R 000002 TIN      0000 R 000210 TT       0011 R 000062 VISC      0006 R 000310 WMOL
0011 R 000075 WTMOL    0005 R 000150 X        0006 R 000270 XS       0000 R 000347 XSKL      0012   000024 Y
0012   000000 Z
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00101    1*          SUBROUTINE TRANSF(T,P)
00101    2*      C                                                              TRAN   2
00101    3*      C   CALCULATES GAS TRANSPORT PROPERTIES                        TRAN   3
00101    4*      C   MAXIMUM = 10 MOLECULES AND 10 REACTIONS
00101    5*      C   NUMBER OF MOLECULES = NM
00101    6*      C   NUMBER OF CHEMICAL REACTIONS = NR                         TRAN   7
00101    7*      C   ARRAY OF STOICHIOMETRIC COEFFICIENTS = STC                TRAN   9
00101    8*      C   CROSS SECTION AND RELAXATION DATA = TABLES                TRAN  14
00101    9*      C   VIBRATIONAL HEAT CAPACITY = CVIBR                         TRAN  13
00101   10*      C   MAXIMUM = 120 TABLES OF 20 TEMPERATURES EACH              TRAN  15
00101   11*      C   IF CROSS SECTION DATA NTAB = 1 , IF RELAXATION DATA NTAB = 2  TRAN  16
00101   12*      C   VISCOSITY=ANS(1), MONATOMIC CONDUCTIVITY= ANS(2),          TRAN  17
00101   13*      C   INTERNAL CONDUCTIVITY=ANS(3), FROZEN CONDUCTIVITY=ANS(4),  TRAN  18
00101   14*      C   REACTION CONDUCTIVITY=ANS(5), EQUILIBRIUM CONDUCTIVITY=ANS(6),  TRAN  19
00101   15*      C   FROZEN CP=ANS(7), EQUILIBRIUM CP=ANS(8),                    TRAN  20
00101   16*      C   FROZEN PRANDTL NUMBER=ANS(9), EQUILIBRIUM PRANDTL NUMBER=ANS(10),  TRAN  21
00101   17*      C   LEWIS NUMBER=ANS(11), MOLECULAR WEIGHT=ANS(12), DENSITY=ANS(13),  TRAN  22
00101   18*      C   REACTION CP=ANS(14), ENTHALPY=ANS(15)                       TRAN  23
00101   19*      C                                                              TRAN  24
00103   20*          INTEGER SUB,SPECIE,SPECE,RELXTN                            TRAN  26
00104   21*          REAL MONCON,INTCON,LEWIS,LEWI
00105   22*          LOGICAL FROZN
00106   23*          DIMENSION ETA(10,10),DELM(10),CHECK(10)
00107   24*          DIMENSION GMAT(10,11),RTPD(10,10),STXS(10,10),XSKL(10,10)
00110   25*          COMMON/CONTRL/FROZN
00111   26*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00112   27*          COMMON/DOUBLE/G(10,11),X(10),IMAT
00113   28*          COMMON/INPUT1/COEF(2,7,10),Q(10),HO(10),SUB(10,3),XS(10),WMOL(10),
00113   29*         1NM,NR
00114   30*          COMMON/INPUT2/TEM(20,20),TABLES(20,20,3),SPECIE(20,2,3),ROTNM(10),
00114   31*         1STC(10,10),SPECE(2,3),NTT(20),NTAB(20)
00115   32*          COMMON/SORT1/OMEGA(10,10),ASTAR(10,10),BSTAR(10,10)
00116   33*          COMMON/TRANS1/CPRR(10),HRRT(10),CVIBR(10),ROTM(10),RELXTN(10),
00116   34*         1ANS(15),LEWI(10,10)
00117   35*          COMMON /INTERP/ Z(20),Y(20,3),NTP,ANSR(3)
00117   36*      C                                                              TRAN  61
00120   37*          EQUIVALENCE (ANS(1) ,VISC  ), (ANS(2) ,MONCON), (ANS(3) ,INTCON)  TRAN  62
00121   38*          EQUIVALENCE (ANS(4) ,FRZCON), (ANS(5) ,REACON), (ANS(6) ,EQCON )  TRAN  63
00122   39*          EQUIVALENCE (ANS(7) ,CPFROZ), (ANS(8) ,CPEQ  ), (ANS(9) ,PRFROZ)  TRAN  64
00123   40*          EQUIVALENCE (ANS(10),PREQ  ), (ANS(11),LEWIS ), (ANS(12),WTMOL )  TRAN  65
00124   41*          EQUIVALENCE (ANS(13),DENSTY), (ANS(14),CPREAC), (ANS(15),ENTLPY)  TRAN  66
00125   42*          EQUIVALENCE (EWL,EGLB)                        , (RTPD,OMEGA)
00126   43*          EQUIVALENCE (STXS,BSTAR)     , (XSKL,ETA)                  TRAN  68
00126   44*      C                                                              TRAN  69
00127   45*          DATA PI/3.14159265/,AVGDRO/6.022169/,BOLTZ/1.380622/       TRAN  70
00133   46*          DATA RPVT/62.0562/,R/1,98726/
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00133   47*     C                                                                TRAN  73
00134   48*          NAMELIST /MATRX/GMAT                                        TRAN  74
00136   49*     C    START TRANSPORT CALCULATIONS                                TRAN 123
00137   50*          NMM=NM
00140   51*          NM=5
00140   52*     C                                                                TRAN  75
00141   53*          TT=T*TIN/1.8
00142   54*          PP=P*PIN/14.7/144.
00143   55*          CALL SORT(TT)
00143   56*     C    CALCULATE VISCOSITY AND MONATOMIC THERMAL CONDUCTIVITY       TRAN 143
00143   57*     C                                                                TRAN 144
00144   58*          CONST = (5./16.)*SQRT(1.0E5*BOLTZ/(PI*AVGDRO))              TRAN 145
00145   59*          DO 24 I=1,15                                                TRAN 146
00150   60*       24 ANS(I)=0.0                                                  TRAN 147
00152   61*          DO 25 I=1,NM                                                TRAN 148
00155   62*          IF(XS(I).LT.1.E-8)XS(I)=1.E-8
00157   63*          DO 25 J=1,NM                                                TRAN 149
00162   64*          ETA(I,J)= (CONST*SQRT(2.0*WMOL(I)*WMOL(J)*TT/(WMOL(I)+WMOL(J)))/  TRAN 150
00162   65*         1 OMEGA(I,J)                                                 TRAN 151
00163   66*       25 ETA(J,I)=ETA(I,J)                                           TRAN 152
00166   67*          DO 27 I=1,NM                                                TRAN 153
00171   68*          DO 27 J=1,NM                                                TRAN 154
00174   69*          IF(I-J) 29,26,29                                            TRAN 155
00177   70*       28 SUM=0.0                                                     TRAN 156
00200   71*          DO 30 K=1,NM                                                TRAN 157
00203   72*          IF(K-I) 31,30,31                                            TRAN 158
00206   73*       31 SUM=2.0*XS(I)*XS(K)*WMOL(I)*WMOL(K)*((5./3.)/ASTAR(I,K)+WMOL(K)/  TRAN 159
00206   74*         1 WMOL(I))/(ETA(I,K)*(WMOL(I)+WMOL(K))**2)+SUM               TRAN 160
00207   75*       30 CONTINUE                                                    TRAN 161
00211   76*          G(I,J)=XS(I)**2/ETA(I,I)+SUM                                TRAN 162
00212   77*          GO TO 27                                                    TRAN 163
00213   78*       29 G(I,J)=-2.0*XS(I)*XS(J)*WMOL(I)*WMOL(J)*((5./3.)/ASTAR(I,J)-1.0)/  TRAN 164
00213   79*         1 (ETA(I,J)*(WMOL(I)+WMOL(J))**2)                           TRAN 165
00214   80*          G(J,I)=G(I,J)                                               TRAN 166
00215   81*       27 CONTINUE                                                    TRAN 167
00220   82*          K=NM+1                                                      TRAN 168
00221   83*          DO 32 I=1,NM                                                TRAN 169
00224   84*       32 G(I,K)=XS(I)                                                TRAN 170
00226   85*          DO 33 I=1,NM                                                TRAN 172
00231   86*          DO 33 J=1,K                                                 TRAN 173
00234   87*       33 GMAT(I,J)=G(I,J)                                            TRAN 174
00237   88*          IMAT=NM
00240   89*          CALL GAUSS                                                  TRAN 175
00241   90*          DO 34 I=1,NM                                                TRAN 176
00244   91*          CHECK(I)=0.0                                                TRAN 177
00245   92*          DO 35 J=1,NM                                                TRAN 178
00250   93*       35 CHECK(I)=CHECK(I)+X(J)*GMAT(I,J)                            TRAN 179
00252   94*          IF(ABS((CHECK(I)-XS(I))/XS(I))-0.0001) 34,36,36             TRAN 180
00255   95*       36 WRITE(6,37) NM,I,CHECK(I),XS(I)                             TRAN 181
00263   96*       37 FORMAT(1H1,31X,48HERROR IN GAUSS SOLUTION IN CALCULATING VISCOSITYTRAN 182
00263   97*         1//3X,10HTHERE ARE  I2,45H EQUATIONS AND THERE IS AN ERROR IN EQUATRAN 183
00263   98*         210N  12,26H THE CALCULATED ANSWER IS  F10.7,12H INSTEAD OF  F10.7 TRAN 184
00263   99*         3//50X,19HTHE MATRIX ARRAY IS/)                             TRAN 185
00264  100*          WRITE(6,MATRX)                                              TRAN 186
00267  101*       34 CONTINUE                                                    TRAN 187
00271  102*          DO 39 I=1,NM                                                TRAN 188
00274  103*       39 VISC=VISC+XS(I)*X(I)                                        TRAN 189
00274  104*     C                                                                TRAN 190
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00276   105*          DO 40 I=1,NM                                                    TRAN 191
00301   106*          DO 40 J=I,NM                                                    TRAN 192
00304   107*          IF(I-J) 42,41,42                                                TRAN 193
00307   108*       41 SUM=0.0                                                         TRAN 194
00310   109*          DO 43 K=1,NM                                                    TRAN 195
00313   110*          IF(K-1) 44,43,44                                                TRAN 196
00316   111*       44 SUM=16.0*XS(I)*XS(K)*(7.5*WMOL(I)**2+6.25*WMOL(K)**2-3.0*       TRAN 197
00316   112*         1 WMOL(K)**2*BSTAR(I,K)+4.0*WMOL(I)*WMOL(K)*ASTAR(I,K))*WMOL(I)* TRAN 198
00316   113*         2 WMOL(K)/(15.0*R*(WMOL(I)+WMOL(K))**3*ASTAR(I,K)*ETA(I,K))+SUM  TRAN 199
00317   114*       43 CONTINUE                                                       TRAN 200
00321   115*          G(I,J)=16.0*XS(I)**2*WMOL(I)/(15.0*R*ETA(I,I))+SUM              TRAN 201
00322   116*          GO TO 40                                                        TRAN 202
00323   117*       42 G(I,J)=-16.0*XS(I)*XS(J)*WMOL(I)**2*WMOL(J)**2*(13.75-3.0*      TRAN 203
00323   118*         1 BSTAR(I,J)-4.0*ASTAR(I,J))/(15.0*R*(WMOL(I)+WMOL(J))**3       TRAN 204
00323   119*         2 *ASTAR(I,J)*ETA(I,J))                                         TRAN 205
00324   120*          G(J,I)=G(I,J)                                                   TRAN 206
00325   121*       40 CONTINUE                                                       TRAN 207
00330   122*          K=NM+1                                                          TRAN 208
00331   123*          DO 45 I=1,NM                                                    TRAN 209
00334   124*       45 G(I,K)=XS(I)                                                    TRAN 210
00336   125*          CALL GAUSS                                                      TRAN 211
00337   126*          DO 47 I=1,NM                                                    TRAN 212
00342   127*       47 MONCON=MONCON+4.0*XS(I)*X(I)                                   TRAN 213
00342   128*       C                                                                 TRAN 214
00342   129*       C     CALCULATE INTERNAL THERMAL CONDUCTIVITY                     TRAN 215
00342   130*       C                                                                 TRAN 216
00344   131*          DO 104 I=1,NM                                                   TRAN 217
00347   *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00347   132*          IF(CVIBR(I).EQ.0.0) CVIBR(I) = CPRR(I)-(2.5+0.5*ROTM(I))       TRAN 218
00351   133*          RELXTN(I)=0.0                                                   TRAN 219
00352   134*      104 CONTINUE                                                        TRAN 222
00354   135*          DO 53 I=1,NM                                                    TRAN 223
00357   *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00357   136*          IF(CPRR(I).EQ.2.5) GO TO 53                                     TRAN 224
00361   137*          SUM=0.0                                                         TRAN 225
00362   138*          DO 54 K=1,NM                                                    TRAN 226
00365   139*          IF(K-I) 55,54,55                                                TRAN 227
00370   140*       55 SUM=SUM+ASTAR(I,I)*ETA(I,I)*XS(K)*2.0*WMOL(K)/(ASTAR(I,K)*      TRAN 228
00370   141*         1 ETA(I,K)*XS(I)*(WMOL(I)+WMOL(K)))                             TRAN 229
00371   142*       54 CONTINUE                                                       TRAN 230
00373   143*          INTCON=INTCON+(1.2*ASTAR(I,I)*(CPRR(I)-2.5)-RELXTN(I)*          TRAN 231
00373   144*         1 (2.5-1.2*ASTAR(I,I))**2/(0.5*PI*RELXTN(I)*(5.0/3.0+1.2*       TRAN 232
00373   145*         2 ASTAR(I,I)/(CPRR(I)-2.5))))*R*ETA(I,I)/WMOL(I)/(1.0+SUM)      TRAN 233
00374   146*       53 CONTINUE                                                       TRAN 234
00376   147*          IF(NR.EQ.0) GO TO 91                                            TRAN 235
00400   148*          IF(FROZN) GO TO 91                                              TRAN 236
00400   149*       C                                                                 TRAN 237
00400   150*       C     CALCULATE REACTION HEAT CAPACITY AND THERMAL CONDUCTIVITY    TRAN 238
00400   151*       C                                                                 TRAN 239
00402   152*          L=1+NR                                                          TRAN 240
00403   153*          DO 64 I=1,NR                                                    TRAN 241
00406   154*          DO 64 J=1,L                                                     TRAN 242
00411   155*          GMAT(I,J)=0.0                                                   TRAN 243
00412   156*       64 G(I,J)=0.0                                                      TRAN 244
00415   157*          DO 65 I=1,NR                                                    TRAN 245
00420   158*          DELH(I)=0.0                                                     TRAN 246
00421   159*          DO 66 K=1,NM                                                    TRAN 247
00424   160*       66 DELH(I)=STC(I,K)*HRRT(K)+DELH(I)                                TRAN 248
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00426  161*        65 G(I,L)=DELH(I)                                          TRAN 249
00430  162*           DO 99 K=1,NM                                            TRAN 250
00433  163*           DO 99 L=K,NM                                            TRAN 251
00436  164*           RTPD(K,L)= 5.C*WMOL(K)*XMOL(L)/                         TRAN 252
00436  165*          1 (3.C*ASTAR(K,L)*ETA(K,L)*(WMOL(K)+WMOL(L)))           TRAN 253
00437  166*           XSKL(K,L) = 1.C/(XS(K)*XS(L))                           TRAN 254
00440  167*           XSKL(L,K) = XSKL(K,L)                                   TRAN 255
00441  168*        99 RTPD(L,K) = RTPD(K,L)                                   TRAN 256
00444  169*           DO 98 I=1,IC
00447  170*           DO 98 J=1,IC
00452  171*        98 IF (ABS(STC(I,J))*LT*1.0E-6)  STC(I,J) = 0.0            TRAN 259
00456  172*           JJ=NM-1                                                 TRAN 260
00457  173*           DO 67 I=1,NR                                            TRAN 261
00462  174*           DO 67 J=1,NR                                            TRAN 262
00465  175*           DO 68 K=1,JJ                                            TRAN 263
00470  176*           LL=K+1                                                  TRAN 264
00471  177*           DO 68 L=LL,NM                                           TRAN 265
00474  178*           STXS(K,L) = C.C                                         TRAN 266
00475  *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00475  179*           IF ((STC(I,K).EQ.C.C).AND.(STC(I,L).EQ.C.C))  GO TO 68  TRAN 267
00477  *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00477  180*           IF ((STC(J,K).EQ.C.C).AND.(STC(J,L).EQ.C.C))  GO TO 68  TRAN 268
00501  181*           STXS(K,L) = XSKL(K,L)*                                  TRAN 269
00501  182*          1 (XS(L)*STC(I,K)-XS(K)*STC(I,L))*                       TRAN 270
00501  183*          2 (XS(L)*STC(J,K)-XS(K)*STC(J,L))                        TRAN 271
00502  184*           G(I,J) = G(I,J)+STXS(K,L)                               TRAN 272
00503  185*           GMAT(I,J) = GMAT(I,J)+RTPD(K,L)*STXS(K,L)               TRAN 273
00504  186*        68 CONTINUE                                                TRAN 274
00507  187*           GMAT(J,I) = GMAT(I,J)                                   TRAN 275
00510  188*        67 G(J,I)=G(I,J)                                           TRAN 276
00513  189*           IMAT=NR                                                 TRAN 277
00514  190*           CALL GAUSS                                              TRAN 278
00515  191*           DO 101 I=1,NR                                           TRAN 279
00520  192*        101 CPREAC=CPREAC+R*DELH(I)*X(I)                           TRAN 280
00520  193*     C                                                            TRAN 281
00522  194*           L=1+NR                                                  TRAN 282
00523  195*           DO 56 I=1,NR                                            TRAN 283
00526  196*           DO 56 J=1,L                                             TRAN 284
00531  197*        56 G(I,J)=0.0                                              TRAN 285
00534  198*           DO 57 I=1,NR                                            TRAN 286
00537  199*        57 G(I,L)=DELH(I)                                          TRAN 287
00541  200*           JJ=NM-1                                                 TRAN 288
00542  201*           DO 59 I=1,NR                                            TRAN 289
00545  202*           DO 59 J=1,NR                                            TRAN 290
00550  203*           G(I,J) = GMAT(I,J)                                      TRAN 291
00551  204*        59 G(J,I)=G(I,J)                                           TRAN 292
00554  205*           CALL GAUSS                                              TRAN 293
00555  206*           DO 70 I=1,NR                                            TRAN 294
00560  207*           CHECK(I)=C.C                                            TRAN 295
00561  208*           DO 71 J=1,NR                                            TRAN 296
00564  209*        71 CHECK(I)=CHECK(I)+X(J)*GMAT(I,J)                        TRAN 297
00566  210*           IF(ABS((CHECK(I)-DELH(I))/DELH(I))-0.01C) 70,72,72      TRAN 298
00571  211*        72 WRITE(6,73) NR,I,CHECK(I),DELH(I)                       TRAN 299
00577  212*        73 FORMAT(1H1,31X,68HERROR IN GAUSS SOLUTION IN CALCULATING REACTION TRAN 300
00577  213*          1THERMAL CONDUCTIVITY//3X,10HTHERE ARE I2,45H EQUATIONS AND THERE ITRAN 301
00577  214*          2S AN ERROR IN EQUATION I2,26H THE CALCULATED ANSWER IS F10.7,  TRAN 302
00577  215*          312H INSTEAD OF F10.7//5DX,19HTHE MATRIX ARRAY IS/)      TRAN 303
00600  216*           WRITE(6,MATEX)                                          TRAN 304
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00003   217*        70 CONTINUE                                                  TRAN 305
00005   218*           DO 75 I=1,IE                                              TRAN 306
00010   219*        75 REACON=REACON+R*DELH(I)*X(I)                              TRAN 307
00010   220*     C                                                               TRAN 308
00010   221*     C     CALCULATE MULTICOMPONENT DIFFUSION COEFFICIENT
00010   222*     C
00012   223*        91 CONTINUE
00013   224*           DO 211 I=1,NN
00016   225*           SUM=0.
00017   226*           DO 212 K=1,NN
00022   227*           IF(K.NE.I)SUM=SUM+XS(K)*BTPD(I,K)
00024   228*       212 CONTINUE
00026   229*           DO 211 J=1,NN
00031   230*           G(I,J)=XS(I)*BTPD(I,J)*WMOL(J)/WMOL(I)*SUM
00032   231*           IF(I.EQ.J)G(I,J)=0.
00034   232*       211 CONTINUE
00034   233*     C
00037   234*           ANSR(1)=1.
00040   235*           CALL GJR(G,II,IO,NM,NM,SIGS,RELXTN,ANSR)
00040   236*     C
00041   237*           DO 221 I=1,NN
00044   238*           DO 221 J=1,NN
00047   239*       221 BTPD(I,J)=(G(J,1)-G(I,1))/WMOL(J)
00047   240*     C     CALCULATE OTHER ANSWERS                                   TRAN 309
00047   241*     C                                                               TRAN 310
00052   242*           FRZCON=MONCON+INTCON
00053   243*           EQCON=FRZCON+REACON                                       TRAN 312
00054   244*           DO 102 I=1,NM                                             TRAN 313
00057   245*           CPFROZ=CPFROZ+XS(I)*CPBR(I)                               TRAN 314
00060   246*           ENTLPY=ENTLPY+XS(I)*HBR(I)                                TRAN 315
00061   247*       102 WTMOL=WTMOL+XS(I)*WMOL(I)                                 TRAN 316
00063   248*           CPFROZ=CPFROZ*R/WTMOL                                     TRAN 317
00064   249*           CPREAC=CPREAC/WTMOL                                       TRAN 318
00065   250*           CPEQ=CPREAC+CPFROZ                                        TRAN 319
00066   251*           ENTLPY=R*TT*ENTLPY/WTMOL                                  TRAN 320
00067   252*           PRFROZ=VISC*CPFROZ/FRZCON                                 TRAN 321
00070   253*           PREQ=VISC*CPEQ/EQCON                                      TRAN 322
00071   254*           DENSTY=(WTMOL*PP)/(RPVT*TT)                               TRAN 323
00072   255*           DO 1111 I=1,NN
00075   256*           DO 1111 J=1,NM
00100   257*           LEWI(I,J)=CPFROZ*BTPD(I,J)*WTMOL**2/FRZCON
00101   258*       1111 CONTINUE
00104   259*           IF(FROZN.GR.NP.EQ.0) GO TO 105                            TRAN 324
00106   260*           LEWIS=(REACON*CPFROZ)/(FRZCON*CPREAC)                     TRAN 325
00107   261*       105 CONTINUE                                                  TRAN 326
00110   262*           NN=NMM
00110   263*     C                                                               TRAN 329
00111   264*           RETURN
00112   *DIAGNOSTIC*  DATA CARD(S) ENCOUNTERED AFTER END CARD.
00112   265*           END                                                       TRAN 332

      END OF COMPILATION:        5 DIAGNOSTICS.
TRANSP          SYMBOLIC          29 NOV 72  11:39:49   0  01545262   14   269  (DELETED)
TRANSP  CODE    RELOCATABLE       29 NOV 72  11:39:49   1  01554550   60     1  (DELETED)
                                                        0  01554644   14   126
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```
@ FOR,* SORT,SORT                                                    18 DEC 72          0:19:37.325
UNIVAC 1106 FORTRAN V EXEC 11 LEVEL 25A  -(EXEC8 LEVEL E12D[DDICA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:37

    SUBROUTINE SORT       ENTRY POINT 000647
               SORT1      ENTRY POINT 000652

    STORAGE USED: CODE(1) 000657; DATA(0) 014770; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   INPUT1 000324
    0004   INPUT2 003524
    0005   SORT1  000454

    EXTERNAL REFERENCES (BLOCK, NAME)

    0006   SPLN1
    0007   SPLN2
    0010   NEXP6$
    0011   ALOG
    0012   SQRT
    0013   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000021 121G    0001   000036 125G    0001   000015 14L     0001   000072 144G    0001   000056 16L
    0001   000165 160G    0001   000170 164G    0001   000061 17L     0001   000213 173G    0001   000001 18L
    0001   000107 20L     0001   000257 206G    0001   000260 211G    0001   000236 22L     0001   000272 221G
    0001   000344 224G    0001   000346 227G    0001   000164 24L     0001   000437 251G    0001   000564 26L
    0001   000477 27L     0001   000511 272G    0001   000534 276G    0001   000453 36L     0005 R 000144 ASTAR
    0005 R 000310 BSTAR    0000 R 004051 COE     0003   000000 COEF    0000 R 000000 D       0003   000226 HO
    0000 I 014704 I        0000   014727 INJPS   0000 I 014703 J       0000 I 014706 JJ      0000 I 014701 K
    0000 I 014702 L        0000 I 014705 M       0000 I 014675 MAXNM   0000 I 014677 NBLANK  0000 I 014676 ND
    0000 I 014700 NK       0003 I 000322 NM      0000 I 014710 NMM     0003   000323 NR      0000 I 000100 NT
    0004   003500 NTAB     0000 I 014707 NTP     0004 I 003454 NTT     0005 R 000000 OMEGA   0004   003270 ROTNM
    0003   000214 S        0004   003446 SPECE   0004 R 003100 SPECIE   0004   003302 STC     0003 R 000240 SUB
    0000 R 001115 TAB      0004 R 000620 TABLES  0000 R 000131 TE      0004 R 000000 TEM     0000 R 000076 V
    0000 R 000002 W        0003 R 000310 WMOL    0003 R 000276 XS

00101     1*          SUBROUTINE SORT
00101     2*     C
00101     3*     C    BRINGS IN AND SORTS OUT INPUT FOR TRANSPORT CALCULATIONS          TRAN  58
00101     4*     C                                                                     INPT   3
00103     5*          COMMON/INPUT1/COEF(2,7,10),S(10),HO(10),SUB(10,3),XS(10),WMOL(10),  INPT   2
00103     6*         1NM,NR
00104     7*          COMMON/INPUT2/TEM(20,20),TABLES(20,20,3),SPECIE(20,2,3),ROTNM(10),
00104     8*         1STC(10,10),SPECE(2,3),NTT(20),NTAB(20)
00105     9*          COMMON/SORT1/OMEGA(10,10),ASTAR(10,10),BSTAR(10,10)
00106    10*          DIMENSION D(2),W(60),V(2),NT(5,5),TE(20,5,5),TAB(20,3,5,5),
00106    11*         1  COE(60,3,5,5)
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FORM 1411-3

```
00107    12*          DATA MAXNN/20/,ND/4HLAST/,NBLANK/1H /                    INPT  48
00107    13*    C                                                              TRAN 122
00107    14*    C     FIND TRANSPORT AND RELAXATON DATA FOR IMPORTANT INTERACTIONS INPT 138
00107    15*    C                                                              INPT 139
00113    16*          NK=0                                                     INPT 148
00114    17*       18 NK=NK+1                                                  INPT 149
00115  *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00115    18*          IF(SPECIE(NK,1,1).EQ.ND) GO TO 22                        INPT 150
00117    19*          K=1                                                      INPT 151
00120    20*       14 DO 16 L=1,NM                                             INPT 152
00123    21*          J=L                                                      INPT 153
00124    22*          DO 15 I=1,3                                              INPT 154
00127  *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00127    23*          IF(SPECIE(NK,K,I).NE.SUB(J,I)) GO TO 16                  INPT 155
00131    24*       15 CONTINUE                                                 INPT 156
00133    25*          IF(K.EQ.2) GO TO 20                                      INPT 157
00135    26*          M=L                                                      INPT 158
00136    27*          GO TO 17                                                 INPT 159
00137    28*       16 CONTINUE                                                 INPT 160
00141    29*          GO TO 18                                                 INPT 161
00142    30*       17 JJ=J                                                     INPT 162
00143    31*          DO 19 I=1,3                                              INPT 163
00146  *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00146    32*          IF(SPECIE(NK,2,I).NE.SUB(J,I)) GO TO 24                  INPT 164
00150    33*       19 CONTINUE                                                 INPT 165
00152    34*          GO TO 20                                                 INPT 166
00153    35*       24 K=2                                                      INPT 167
00154    36*          GO TO 14                                                 INPT 168
00155    37*       20 NTP=NTT(NK)                                              INPT 169
00156    38*          NT(L,M)=NTT(NK)
00157    39*          DO 39 I=1,NTP                                            INPT 170
00162    40*          TE(I,L,M)=TEM(NK,I)
00163    41*          DO 39 J=1,3                                              INPT 172
00166    42*          TAB(I,J,L,M)=TABLES(NK,I,J)
00167    43*       37 CONTINUE                                                 INPT 174
00172    44*          DO 49 J=1,3
00175    45*          CALL SPLN1(NT(L,M),TE(1,L,M),TAB(1,J,L,M),2,D,COE(1,J,L,M),W)
00176    46*       49 CONTINUE
00200    47*          GO TO 18                                                 INPT 190
00201    48*       22 CONTINUE
00202    49*          RETURN
00203    50*          ENTRY SORT1(TT)
00205    51*          DO 9 I=1,NM                                              INPT 140
00210    52*          DO 9 J=1,NM                                              INPT 145
00213    53*          OMEGA(I,J)=0.0                                           INPT 146
00214    54*        9 CONTINUE                                                 INPT 147
00217    55*          V(1)=TT
00220    56*          DO 1 L=1,NM
00223    57*          DO 1 M=L,NM
00226    58*          DO 2 J=1,3
00231    59*          CALL SPLN2(NT(L,M),TE(1,L,M),TAB(1,J,L,M),COE(1,J,L,M),V)
00232    60*          IF(J.EQ.1)OMEGA(L,M)=V(2)
00234    61*          IF(J.EQ.2)ASTAR(L,M)=V(2)
00236    62*          IF(J.EQ.3)BSTAR(L,M)=V(2)
00240    63*       2  CONTINUE
00242    64*          OMEGA(M,L)=OMEGA(L,M)                                    INPT 187
00243    65*          ASTAR(M,L)=ASTAR(L,M)                                    INPT 188
00244    66*          BSTAR(M,L)=BSTAR(L,M)                                    INPT 189
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00245     67*        1   CONTINUE
00245     68*    C                                                          INPT 191
00245     69*    C   MAKE ESTIMATES FOR MISSING DATA                         INPT 192
00245     70*    C                                                          INPT 193
00250     71*        DO 27 I=1,NM
00253     72*        IF(OMEGA(I,I).GT.0) GO TO 27
00255     73*        K=I
00256     74*        IF(AS(I).LT.5.0E-6) GO TO 36                           INPT 197
00260     75*       36 CONTINUE                                             INPT 201
00261     76*        OMEGA(I,I) = ALOG (320.*WNOL(I)**4/IT**1.4)            INPT 202
00262     77*        IF (OMEGA(I,I).LT.1.) OMEGA(I,I) = 1.                  INPT 203
00264     78*        ASTAR(I,I)=1.0                                         INPT 204
00265     79*        BSTAR(I,I)=1.0                                         INPT 205
00266     80*       27 CONTINUE                                             INPT 206
00270     81*        NMM=NM-1                                               INPT 207
00271     82*        DO 23 I=1,NMM                                          INPT 208
00274     83*        K=I+1                                                  INPT 209
00275     84*        DO 23 J=K,NM                                           INPT 210
00300     85*        IF(OMEGA(I,J).GT.0) GO TO 26
00302     86*        OMEGA(I,J)=(OMEGA(I,I)+OMEGA(J,J)+2.*SQRT(OMEGA(I,I)*OMEGA(J,J))) INPT 212
00302     87*       1/4.0                                                   INPT 213
00303     88*        ASTAR(I,J)=(ASTAR(I,I)+ASTAR(J,J))/2.                  INPT 214
00304     89*        BSTAR(I,J)=(BSTAR(I,I)+BSTAR(J,J))/2.                  INPT 215
00305     90*       26 OMEGA(J,I)=OMEGA(I,J)                                INPT 216
00306     91*        ASTAR(J,I)=ASTAR(I,J)                                  INPT 217
00307     92*        BSTAR(J,I)=BSTAR(I,J)                                  INPT 218
00310     93*       23 CONTINUE                                             INPT 219
00313     94*        RETURN                                                 INPT 273
00314    *DIAGNOSTIC* DATA CARD(S) ENCOUNTERED AFTER END CARD.
00314     95*        END                                                    INPT 274

      END OF COMPILATION:          4 DIAGNOSTICS.
SORT              SYMBOLIC          29 NOV 72  11:39:52   0  01560210   14   108  (DELETED)
SORT    CODE      RELOCATABLE       29 NOV 72  11:39:52   1  01563160   36     1  (DELETED)
                                                           0  01563224   14    46
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@ FOR,* SPLN1,SPLN1                                                    18 DEC 72          0:19:40.142
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12D10GICA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:40

    SUBROUTINE SPLN1      ENTRY POINT 000343

    STORAGE USED: CODE(1) 000403; DATA(0) 000067; BLANK COMMON(2) 000000

    EXTERNAL REFERENCES (BLOCK, NAME)

     0003   .ERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001   000072 100L      0001   000130 122G      0001   000246 150G      0001   000103 200L      0001   000203 350L
     0001   000222 400L      0001   000233 500L      0001   000267 700L      0001   000307 800L      0000 R 000004 AI
     0000 R 000005 N         0001 I 000003 I         0000 I 000006 II        0000   000015 INJP$     0000 I 000002 M
     0000 R 000000 W         0000 R 000001 YI

00101    1*          SUBROUTINE SPLN1 (N,X,Y,J,D,C,W)                                        SPLN1
00103    2*          DIMENSION X(1),Y(1),D(2),C(1),W(1)                                      SPLN1
00103    3*    C     ------------------------------------------------------------------      SPLN1
00103    4*    C           OVER THE INTERVAL X(I) TO X(I+1), THE INTERPOLATING               SPLN1
00103    5*    C           POLYNOMIAL                                                        SPLN1
00103    6*    C                Y=Y(I)+A(I)*Z+B(I)*Z**2+E(I)*Z**3                            SPLN1
00103    7*    C           WHERE Z=(X-X(I))/(X(I+1)-X(I))                                    SPLN1
00103    8*    C           IS USED. THE COEFFICIENTS A(I),B(I) AND E(I) ARE COMPUTED         SPLN1
00103    9*    C           BY SPLN1 AND STORED IN LOCATIONS C(3*I-2),C(3*I-1) AND            SPLN1
00103   10*    C           C(3*I) RESPECTIVELY.                                              SPLN1
00103   11*    C           WHILE WORKING IN THE ITH INTERVAL,THE VARIABLE Q WILL             SPLN1
00103   12*    C           REPRESENT Q=X(I+1) - X(I), AND Y(I) WILL REPRESENT                SPLN1
00103   13*    C           Y(I+1)-Y(I)                                                       SPLN1
00103   14*    C     ------------------------------------------------------------------      SPLN1
00103   15*    C                                                                             SPLN1
00104   16*          Q=X(2) - X(1)                                                           SPLN1
00105   17*          YI =Y(2) - Y(1)                                                         SPLN1
00106   18*          IF (J.EQ.2) GO TO 100                                                   SPLN1
00106   19*    C     ------------------------------------------------------------------      SPLN1
00106   20*    C           IF THE FIRST DERIVATIVE AT THE END POINTS IS GIVEN,               SPLN1
00106   21*    C           A(1) IS KNOWN, AND THE SECOND EQUATION BECOMES                    SPLN1
00106   22*    C           MERELY E(1)+E(1)=YI - Q*D(1).                                     SPLN1
00106   23*    C     ------------------------------------------------------------------      SPLN1
00110   24*          C(1)=Q*D(1)                                                             SPLN1
00111   25*          C(2)=1.0                                                                SPLN1
00112   26*          W(2)=YI-C(1)                                                            SPLN1
00113   27*          GO TO 200                                                               SPLN1
00113   28*    C     ------------------------------------------------------------------      SPLN1
00113   29*    C           IF THE SECOND DERIVATIVE AT THE END POINTS IS GIVEN               SPLN1
00113   30*    C           B(1) IS KNOWN, THE SECOND EQUATION BECOMES                        SPLN1
00113   31*    C           A(1)+E(1)=YI-0.5*Q*Q*D(1), DURING THE SOLUTION OF                 SPLN1
00113   32*    C           THE 3N-4 EQUATIONS,AI WILL BE KEPT IN CELL C(2)                   SPLN1
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00113    33*    C              INSTEAD OF C(1) TO RETAIN THE TRIDIAGONAL FORM OF THE      SPLN1
00113    34*    C              COEFFICIENT MATRIX.                                        SPLN1
00113    35*    C     ---------------------------------------------------------------SPLN1
00114    36*          100      C(2)=0.0                                                   SPLN1
00115    37*                   B(2)=0.5*Q*Q*D(1)                                          SPLN1
00116    38*          200      M=N-2                                                      SPLN1
00117    39*                   IF(M.LE.0) GO TO 350                                       SPLN1
00117    40*    C     ---------------------------------------------------------------SPLN1
00117    41*    C              UPPER TRIANGULARIZATION OF THE TRIDIAGONAL SYSTEM OF       SPLN1
00117    42*    C              EQUATIONS FOR THE COEFFICIENT MATRIX FOLLOWS--             SPLN1
00117    43*    C     ---------------------------------------------------------------SPLN1
00121    44*                   DO 300 I=1,M                                               SPLN1
00124    45*                   AI=Q                                                       SPLN1
00125    46*                   Q=X(I+2)-X(I+1)                                            SPLN1
00126    47*                   H=AI/Q                                                     SPLN1
00127    48*                   C(3*I)=-H/(2.0+C(3*I-1))                                   SPLN1
00130    49*                   W(3*I)=(-YI-W(3*I-1))/(2.0 + C(3*I-1))                     SPLN1
00131    50*                   C(3*I+1)=-H*H/(4+C(3*I))                                   SPLN1
00132    51*                   W(3*I+1)=(YI-W(3*I))/(4+C(3*I))                            SPLN1
00133    52*                   YI=Y(I+2)-Y(I+1)                                           SPLN1
00134    53*                   C(3*I+2)=1.0/(1.0-C(3*I+1))                                SPLN1
00135    54*          300      W(3*I+2)=(YI-W(3*I+1))/(1.0-C(3*I+1))                      SPLN1
00135    55*    C     ---------------------------------------------------------------SPLN1
00135    56*    C              E(N-1) IS DETERMINED DIRECTLY FROM THE LAST EQUATION       SPLN1
00135    57*    C              OBTAINED ABOVE, AND THE FIRST OR SECOND DERIVATIVE         SPLN1
00135    58*    C              VALUE GIVEN AT THE END POINT.                              SPLN1
00135    59*    C     ---------------------------------------------------------------SPLN1
00137    60*          350      IF(J.EQ.1) GO TO 400                                       SPLN1
00141    61*                   C(3*N-3)=(Q*Q*D(2)/2.0-W(3*N-4))/(3.0- C(3*N-4))           SPLN1
00142    62*                   GO TO 500                                                  SPLN1
00143    63*          400      C(3*N-3)=(Q*B(2)-YI-W(3*N-4))/(2.0-C(3*N-4))               SPLN1
00144    64*          500      M=3*N-6                                                    SPLN1
00145    65*                   IF(M.LE.0) GO TO 700                                       SPLN1
00145    66*    C     ---------------------------------------------------------------SPLN1
00145    67*    C              BACK SOLUTION FOR ALL COEFFICENTS EXCEPT                   SPLN1
00145    68*    C              A(1) AND B(1) FOLLOWS--                                    SPLN1
00145    69*    C     ---------------------------------------------------------------SPLN1
00147    70*                   DO 600 II=1,M                                              SPLN1
00152    71*                   I=M-II+3                                                   SPLN1
00153    72*          600      C(I)=W(I)-C(I)*C(I+1)                                      SPLN1
00155    73*          700      IF(J.EQ.1) GO TO 800                                       SPLN1
00155    74*    C     ---------------------------------------------------------------SPLN1
00155    75*    C              IF THE SECOND DERIVATIVE IS GIVEN AT THE END POINTS,       SPLN1
00155    76*    C              A(1) CAN NOW BE COMPUTED FROM THE KNOWN VALUES OF          SPLN1
00155    77*    C              B(1) AND E(1). THEN A(1) AND B(1) ARE PUT INTO THEIR       SPLN1
00155    78*    C              PROPER PLACES IN THE C ARRAY.                              SPLN1
00155    79*    C     ---------------------------------------------------------------SPLN1
00157    80*                   C(1)=Y(2) - Y(1)-W(2)-C(3)                                 SPLN1
00160    81*                   C(2)=W(2)                                                  SPLN1
00161    82*                   RETURN                                                     SPLN1
00162    83*          800      C(2)=W(2)-C(3)                                             SPLN1
00163    84*                   RETURN                                                     SPLN1
00164    85*                   END                                                        SPLN1

        END OF COMPILATION:        NO DIAGNOSTICS.

SPLN1            SYMBOLIC          29 NOV 72  11:39:54   0  01564430   14    85  (DELETED)
SPLN1   CODE     RELOCATABLE       29 NOV 72  11:39:54   1  01566676   24     1  (DELETED)
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@ FOR,* SPLN2,SPLN2                                                    18 DEC 72          0:19:42.349
UNIVAC 1106 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12D1001CA)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:42

    SUBROUTINE SPLN2      ENTRY POINT 000130

    STORAGE USED: CODE(I) 000146; DATA(D) 000034; BLANK COMMON(2) 000000

    EXTERNAL REFERENCES (BLOCK, NAME)

     0003    .ERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001   000031 107G       0001   000054 20L       0001   000063 30L       0000 I 000001 I          0000   000007 INJP$
     0000 I 000000 LIM        0000 R 000002 Q         0000 R 000003 Z

00101     1*          SUBROUTINE SPLN2 (N,X,Y,C,V)
00103     2*          DIMENSION X(1),Y(1),C(1),V(5)
00104     3*          V(5)=2.0
00105     4*          LIM=N-1
00105     5*    C     ------------------------------------------------
00105     6*    C     DETERMINE IN WHICH INTERVAL THE INDEPENDENT
00105     7*    C     VARIABLE,V(1),LIES.
00105     8*    C     ------------------------------------------------
00106     9*          DO 10 I=2,LIM
00111    10*    10    IF(V(1).LT.X(I)) GO TO 20
00114    11*          I=N
00115    12*          IF(V(1).GT.X(N)) V(5)=3.0
00117    13*          GO TO 30
00120    14*    20    IF(V(1).LT.X(I)) V(5) =1.0
00120    15*    C     ------------------------------------------------
00120    16*    C     Q IS THE SIZE OF THE INTERVAL CONTAINING V(1).
00120    17*    C     ------------------------------------------------
00120    18*    C     Z IS A LINEAR TRANSFORMATION OF THE INTERVAL
00120    19*    C     ONTO (0,1) AND IS THE VARIABLE FOR WHICH
00120    20*    C     THE COEFFICIENTS WERE COMPUTED BY SPLN1.
00120    21*    C     ------------------------------------------------
00122    22*       30 Q=X(I)-X(I-1)
00123    23*          Z=(V(1)-X(I-1))/Q
00124    24*          V(2)=((Z*C(3*I-3)+C(3*I-4))*Z+C(3*I-5))*Z+Y(I-1)
00125    25*          RETURN
00126    26*          END

      END OF COMPILATION:        NO  DIAGNOSTICS.
    SPLN2          SYMBOLIC                    29 NOV 72  11:39:56   0  01567536   14   26  (DELETED)
    SPLN2   CODE   RELOCATABLE                 29 NOV 72  11:39:56   1  01570312   24    1  (DELETED)
                                                                     0  01570342   14   11
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@ FOR,* GAUSS,GAUSS                                                    18 DEC 72          0:19:43.637
UNIVAC 1108 FORTRAN V EXEC 1: LEVEL 25A -(EXEC8 LEVEL E1201D010A)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:43

    SUBROUTINE GAUSS     ENTRY POINT 000353

    STORAGE USED: CODE(1) 000372; DATA(0) 000073; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   DOUBLE 000171

    EXTERNAL REFERENCES (BLOCK, NAME)

    0004   .ERR3S

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000102 10L      0001   000011 11IG     0001   000037 122G     0001   000053 131G     0001   000327 151L
    0001   000121 154G     0001   000147 174G     0001   000110 18L      0001   00017O 205G     0001   000132 22L
    0001   000234 220G     0001   000235 223G     0001   000324 23L      0001   000303 243G     0001   000155 31L
    0001   000252 45L      0001   000260 47L      0001   000310 51L      0001   00002O 8L       0001   000073 9L
    0000 R 000024 BIGNO     0000 R 000000 COEFX     0003 R 000000 G       0000 I 000027 I       0003 I 000170 IMAT
    0000   000037 INJP$     0000 I 000025 IUSE1     0000 I 000030 J       0000 I 000034 K       0000 I 000026 NN
    0000 R 000031 SUM       0000 R 000033 TEMP      0003 R 000156 X       0000 R 000032 Z

464

00101     1*          SUBROUTINE GAUSS                                          GAUS  1
00101     2*     C                                                              GAUS  2
00101     3*     C    SOLVE ANY LINEAR SET OF UP TO 20 EQUATIONS                GAUS  3
00101     4*     C    NUMBER OF EQUATIONS = IMAT                                GAUS  4
00101     5*     C                                                              GAUS  5
00103     6*          DIMENSION COEFX(20)                                       GAUS  7
00103     7*     C
00104     8*          COMMON/DOUBLE/G(10,11),X(10),IMAT                         GAUS 13
00104     9*     C                                                              GAUS 14
00105    10*          DATA BIGNO/1.E+38/                                        GAUS 15
00105    11*     C                                                              GAUS 16
00105    12*     C    BEGIN ELIMINATION OF NNTH VARIABLE                        GAUS 17
00105    13*     C                                                              GAUS 18
00107    14*          IUSE1 = IMAT+1                                            GAUS 19
00110    15*        6 DO 45  NN=1,IMAT                                          GAUS 20
00113    16*          IF(NN-IMAT)  8,83,8                                       GAUS 21
00116    17*         83 IF(G(NN,NN)) 31,23,31                                   GAUS 22
00116    18*     C                                                              GAUS 23
00116    19*     C    SEARCH FOR MAXIMUM COEFFICIENT IN EACH ROW                GAUS 24
00116    20*     C                                                              GAUS 25
00121    21*        8 DO 18  I=NN,IMAT                                          GAUS 26
00124    22*          COEFX(I) = BIGNO
00125  *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00125    23*          IF(G(I,NN).EQ.0.)  GO TO 18                               GAUS 27
00127    24*          COEFX(I) = 0.                                             GAUS 28
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00130   25*          DO 10 J=NN,IUSE1                                          GAUS  29
00133   26*          SUM = G(I,J)                                              GAUS  30
00134   27*          IF(SUM.LT.0.)  SUM=-SUM                                   GAUS  31
00136   28*          IF(J.NE.NN)  GO TO 9                                      GAUS  32
00140   29*          Z = SUM                                                   GAUS  33
00141   30*          GO TO 10                                                  GAUS  34
00142   31*        9 IF(SUM.GT.COEFX(I))  COEFX(I)=SUM                         GAUS  35
00144   32*       10 CONTINUE                                                  GAUS  36
00146   33*          COEFX(I) = COEFX(I)/Z                                     GAUS  37
00147   34*       18 CONTINUE                                                  GAUS  38
00147   35*     C                                                             GAUS  39
00147   36*     C    LOCATE ROW WITH SMALLEST MAXIMUM COEFFICIENT             GAUS  40
00147   37*     C                                                             GAUS  41
00151   38*          TEMP = BIGNO                                              GAUS  42
00152   39*          I=0                                                       GAUS  43
00153   40*       20 DO 22  J=NN,IMAT                                          GAUS  44
00156   41*          IF (COEFX(J)-TEMP) 87,22,22                               GAUS  45
00161   42*       87 TEMP=COEFX(J)                                             GAUS  46
00162   43*          I=J                                                       GAUS  47
00163   44*       22 CONTINUE                                                  GAUS  48
00165   45*          IF(I) 28,23,28                                            GAUS  49
00165   46*     C                                                             GAUS  50
00165   47*     C    INDEX I LOCATES EQUATION TO BE USED FOR ELIMINATING THE NTH GAUS  51
00165   48*     C    VARIABLE FROM THE REMAINING EQUATIONS                    GAUS  52
00165   49*     C                                                             GAUS  53
00165   50*     C    INTERCHANGE EQUATIONS I AND NN                           GAUS  54
00165   51*     C                                                             GAUS  55
00170   52*       28 IF(NN-I) 29,31,29                                        GAUS  56
00173   53*       29 DO 30 J=NN,IUSE1                                         GAUS  57
00176   54*          Z=G(I,J)                                                 GAUS  58
00177   55*          G(I,J)=G(NN,J)                                           GAUS  59
00200   56*          G(NN,J)=Z                                                GAUS  60
00201   57*       30 CONTINUE                                                 GAUS  61
00201   58*     C                                                             GAUS  62
00201   59*     C    DIVIDE NTH ROW BY NTH DIAGONAL ELEMENT AND ELIMINATE THE NTH GAUS 63
00201   60*     C    VARIABLE FROM THE REMAINING EQUATIONS                    GAUS  64
00201   61*     C                                                             GAUS  65
00203   62*       31 K = NN + 1                                               GAUS  66
00204   63*          DO 36 J = K, IUSE1                                       GAUS  67
00207  *DIAGNOSTIC*  THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00207   64*          IF(G(NN,NN).EQ.0.)  GO TO 23                             GAUS  68
00211   65*          G(NN,J) = G(NN,J) / G(NN,NN)                             GAUS  69
00212   66*       36 CONTINUE                                                 GAUS  70
00214   67*          IF(K-IUSE1) 88,45,88                                     GAUS  71
00217   68*       88 DO 44  I=K,IMAT                                          GAUS  72
00222   69*       40 DO 44 J = K,IUSE1                                        GAUS  73
00225   70*          G(I,J) = G(I,J) - G(I,NN)*G(NN,J)                        GAUS  74
00226   71*       44 CONTINUE                                                 GAUS  75
00231   72*       45 CONTINUE                                                 GAUS  76
00231   73*     C                                                             GAUS  77
00231   74*     C    BACKSOLVE FOR THE VARIABLES                              GAUS  78
00231   75*     C                                                             GAUS  79
00233   76*          K = IMAT                                                 GAUS  80
00234   77*       47 J = K + 1                                                GAUS  81
00235   78*          X(K) = 0.000                                             GAUS  82
00236   79*          SUM = 0.0                                                GAUS  83
00237   80*          IF(IMAT-J)  51,48,48                                     GAUS  84
00242   81*       48 DO 50  I=J,IMAT                                          GAUS  85
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0C245     82*          SUM = SUM + G(K,I)* X(I)                                  GAUS  86
0C246     83*       50 CONTINUE                                                  GAUS  87
0C250     84*       51 X(K) = G(K,IUSE(I) - SUM                                  GAUS  88
0C251     85*          K = K - 1                                                 GAUS  89
0C252     86*          IF(K) 47,151,47                                           GAUS  90
0C255     87*       23 IMAT = IMAT-1                                             GAUS  91
0C256     88*      151 RETURN                                                    GAUS  92
0C257    *DIAGNOSTIC* DATA CARD(S) ENCOUNTERED AFTER END CARD.
0C257     89*          END                                                       GAUS  93

     END OF COMPILATION:       3 DIAGNOSTICS.

GAUSS          SYMBOLIC       29 NOV 72  11:39:58   0  01570574   14   91  (DELETED)
GAUSS   CODE   RELOCATABLE    29 NOV 72  11:39:58   1  01573166   24    1  (DELETED)
                                                    0  01573216   14   27
```

```
@ FOR,* OUTPUT,OUTPUT                                                    18 DEC 72          0:19:45.641
UNIVAC 1106 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E120100I0A)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:45


    SUBROUTINE OUTPUT     ENTRY POINT 000530

    STORAGE USED: CODE(1) 000543; DATA(0) 000163; BLANK COMMON(2) 000000

     COMMON BLOCKS:

     0003   MAIN1  000016
     0004   MAIN2  000037
     0005   MAIN3  000006
     0006   MAIN4  000207
     0007   MAIN5  000056
     0010   BODY1  000113
     0011   SHOCK1 000074
     0012   BEGIN1 003751
     0013   THERM1 003751
     0014   STRES1 000005
     0015   HEAT1  000002
     0016   DIFU1  000026
     0017   CONR2  000041
     0020   TRAN1  000146
     0021   INPUT1 000324
     0022   INPUR1 000324
     0023   JANAF1 000031
     0024   DIFF1  035002

    EXTERNAL REFERENCES (BLOCK, NAME)

     0025   CONVR2
     0026   TRANSC
     0027   DIFFUS
     0030   HEAT
     0031   STRESS
     0032   MODUS
     0033   MIO2S
     0034   MIO1S
     0035   SQRT
     0036   MBUS
     0037   MEFS
     0040   MERR3S

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0000   000015 100F    0000   000016 101F    0000   000040 102F    0000   000044 103F    0000   000065 104F
     0000   000077 105F    0000   000101 111F    0000   000122 116F    0000   000125 117F    0001   000027 160G
     0001   000051 175G    0001   000115 211G    0001   000124 216G    0001   000225 242G    0001   000374 313G
     0001   000420 326G    0001   000425 332G    0001   000432 336G    0001   000437 342G    0001   000444 346G
     0001   000451 352G    0001   000456 356G    0001   000463 362G    0001   000470 366G    0001   000475 372G
     0013 R 001243 A       0024 R 000003 ACH     0005   000005 AIN     0021 R 000240 ANAME   0004   000033 ANGLE
     0020   000000 AP1     0020   000001 AP2     0020   000002 AP3     0021 R 000310 ATWT    0000 R 000004 A2
     0007   000000 BETA    0010   000074 BXI     0000 R 000013 CF      0000 R 000014 CH      0021   000000 COEF
```

0022	000026	COEFA	0022	000052	COEFB	0023	000025	CPTOT	0010	000056	CURV	0023	000026	CVTOT	
0000 R	000011	DAM	0000 R	000015	DHSTAG	0017 R	000027	DISS	0004	000013	DNU	0004 R	000015	DTI	
0004 R	000016	DT2	0000 R	000005	DUM	0000 R	000001	DUM2	0004	000014	DXI	0016	000000	DI	
0016	000013	D2	0005	000003	EIN	0004	000030	ELL	0004	000021	EPS	0004	000024	ERR	
0022	000002	ETA	0022	000122	FRACT	0004	000006	GA	0023	000030	GAMA	0004 R	000002	GAMMA	
0004	000007	GB	0004	000010	GC	0004	000011	GD	0004	000012	GE	0023	000000	GRRT	
0000 R	000007	HH	0023 R	000012	HHH	0012 R	000000	HH1	0012 R	001243	HH2	0012 R	002506	HH3	
0005 R	000004	HIN	0004	000027	HST	0021	002226	HO	0017 R	000000	H1	0017	000013	H1NU	
0017	000015	H1X1	0017 R	000003	H12	0017 R	000006	H123	0017 R	000001	H2	0017	000016	H2NU	
0017	000014	H2X1	0017	000004	H23	0017 R	000002	H3	0017	000020	H3NU	0017	000017	H3X1	
0017	000021	H3X1NU	0017	000022	H3X1X1	0017	000005	H31	0000 I	000003	I	0000	000136	INJPS	
0022	000134	IPR	0022	000076	ITYPE	0003	000006	JA	0003	000015	JC	0003 I	000010	K	
0003	000007	KA	0003	000013	LB	0003	000014	LE	0004 R	000035	LEWIS	0000 I	000000	M	
0003	000000	MA	0003 I	000004	MC	0003	000002	MCM	0003 I	000011	MI	0000 I	000002	N	
0003	000001	NA	0003 I	000005	NC	0003	000003	NCM	0021	000322	NM	0021	000323	NR	
0022	000001	NREACT	0022 I	000000	NSPEC	0006 R	000017	NU	0003 I	000012	NI	0013 R	000000	P	
0010	000036	PHI	0005 R	000000	PIN	0014	000000	PI11	0014 R	000001	PI12	0014	000002	PI21	
0014	000003	PI22	0014	000004	PI33	0000 R	000006	PP	0004	000004	PR	0011 R	000055	PSI	
0021	000214	Q	0015	000000	Q1	0015 R	000001	Q2	0004	000003	RE	0005 R	000001	RIN	
0004	000036	RN	0006 R	000074	S	0006 R	000113	SN	0023	000027	SOUND	0007	000001	SQEZ	
0006 R	000132	ST	0004	000005	STAB	0006 R	000151	STN	0021	000240	SUB	0006 R	000170	SXI	
0013 R	002506	T	0004 R	000034	TIME	0005	000002	TIN	0000 R	000012	TT	0004	000032	TW	
0024 R	000000	U	0017	000023	UJ	0024 R	016401	UN	0004 R	000001	UO	0017 R	000007	UI	
0017 R	000010	U2	0017 R	000011	U3	0017 R	000012	U4	0021	000310	WMOL	0023 R	000024	WSUM	
0006 R	000000	XI	0004	000031	XIMAX	0021	000276	XS	0010	000000	YB	0011 R	000000	YS	
0004	000020	YO	0010	000017	ZB	0011 R	000017	ZS	0011	000036	ZSY	0004	000017	ZO	

```
00101     1*          SUBROUTINE OUTPUT
00101     2*      C
00103     3*          INCLUDE PROC,LIST
00104     3*          REAL NU,LEWIS
00105     3*          PARAMETER MM=45,NM=15,JJ=11
00106     3*          COMMON/MAIN1/MA,NA,MCM,NCM,MC,NC,JA,KA,K,M1,N1,LB,LE,JC
00107     3*          COMMON/MAIN2/ACH,UO,GAMMA,RE,PR,STAB,GA,GB,GC,GD,GE,DNU,DXI,DTI,
00107     3*         1DT2,ZO,YO,EPS(3),ERR(3),HST,ELL,XIMAX,TW,ANGLE,TIME,LEWIS,RN
00110     3*          COMMON/MAIN3/PIN,RIN,TIN,EIN,HIN,AIN
00111     3*          COMMON/MAIN4/XI(MM),NU(NM),S(MM),SN(MM),ST(MM),STN(NM),SXI(MM)
00112     3*          COMMON/MAIN5/BETA,SQEZ(NM)
00113     3*          COMMON/BODY1/YB(MM),ZB(MM),PHI(MM),CURV(MM),DXI(MM)
00114     3*          COMMON/SHOCK1/YS(MM),ZS(MM),ZST(MM),PSI(MM)
00115     3*          COMMON/REGION1/HH1(NM,MM),HH2(NM,MM),HH3(NM,MM)
00116     3*          COMMON/THERM1/P(NM,MM),A(NM,MM),T(NM,MM)
00117     3*          COMMON/STRES1/PI11,PI12,PI21,PI22,PI33
00120     3*          COMMON/HEAT1/H1,H2
00121     3*          COMMON/DIFU1/D1(JJ),D2(JJ)
00122     3*          COMMON/CONR2/H1,H2,H3,H12,H23,H31,H123,U1,U2,U3,U4,H1NU,H2X1,H1X1,
00122     3*         1             H2NU,H3X1,H3NU,H3X1NU,H3X1X1,UJ(JJ)
00123     3*          COMMON/TRAN1/AP1,AP2,AP3(10,10)
00124     3*          END
00125     4*          DIMENSION DISS(10),ANAME(10),ATWT(10)
00126     5*          COMMON/INPUT1/COEF(2,7,10),Q(10),HO(10),SUB(10,3),XS(10),WMOL(10),
00126     5*         1NM,NR
00127     7*          COMMON/INPUR1/NSPEC,NREACT,ETA(20),COEFA(20),COEFB(20),ITYPE(20),
00127     8*         1FRACT(10),(PR(20,6)
00130     9*          COMMON/JANAF1/GRRT(10),HHH(10),WSUM,CPTOT,CVTOT,SOUND,GAMA
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00131   10*         COMMON/DIFF1/U(NN,MM,JJ),UN(NN,MM,JJ)
00132   11*         EQUIVALENCE (ANAME,SUB(1,1)),(ATWT,AMOL)
00133   12*         EQUIVALENCE (DISS, DJ(5))
00133   13*    C
00134   14*      100 FORMAT(1H1)
00135   15*      101 FORMAT(1H0,9H AT LINE ,I10/10X,1HP,12X,1HT,12X,3HRHO,12X,1HU,12X,1
00135   16*         1HV,11X,1HE,12X,1HM,13X,1HZ,7X,2HCF,7X,2HCH)
00136   17*      102 FORMAT(I3,8E13.5,2X,2E9.4)
00137   18*      103 FORMAT(1H1,8H AT STEP,I10,15X,5H DT1=E16.7,3X,5H DT2=E16.7,3X,
00137   19*         1      5HAT N=I3,4H, M=I3,/,50X,5HTIME=E16.7/1H0)
00140   20*      104 FORMAT(35X,5HY     ,5X,,4HSHOCK VELOCITY,9X,2HSY,12X,2HZS,15X,2HYS)
00141   21*      106 FORMAT(127,5E15.5)
00142   22*      111 FORMAT(1H0,9H AT LINE ,I10/10X,1HP,12X,1HT,12X,3HRHO,12X,1HU,12X,1
00142   23*         1HV,11X,1HE,12X,1HM,13X,1HZ,7X,6HDHSTAG)
00143   24*      116 FORMAT(1H,10X,10(A6,6X))
00144   25*      117  FORMAT(1H ,10(3X,E10.5))
00144   26*    C
00145   27*         WRITE(6,103)K,DT1,DT2,N1,M1,TIME
00155   28*         WRITE(6,104)
00157   29*         DO 35 N=2,NC
00162   30*         DUN2=X1(M)
00163   31*      35 WRITE(6,106)M,DUN2,ST(M),PSI(M),ZS(M),YS(M)
00174   32*         DO 50 N=2,NC
00177   33*         IF(N.NE.NC)WRITE(6,111)N
00203   34*         IF(N.EQ.NC)WRITE(6,101)N
00207   35*         WRITE(6,116)(ANAME(I),I=1,NSPEC)
00215   36*         DO 50 M=2,MC
00220   37*         H1=HH1(N,M)
00221   38*         H2=HH2(N,M)
00222   39*         H3=HH3(N,M)
00223   40*         H12=H1*H2
00224   41*         H123=H12
00225   42*         CALL CONVR2(N,M)
00226   43*         CALL TRANSC(N,M)
00227   44*         IF(N.EQ.NC)CALL DIFFUS(N,M)
00231   45*         IF(N.EQ.NC)CALL HEAT(N,M)
00233   46*         IF(N.EQ.NC)CALL STRESS(N,M)
00235   47*         A2=A(N,M)*A(N,M)
00236   48*         DUM=SQRT((U2*U2+U3*U3)/A2)
00237   49*         PP=P(N,M)
00240   50*         HH=0.
00241   51*         DO 33 I=1,NSPEC
00244   52*      33 HH=HH+DISS(I)*HHH(I)/ATWT(I)
00246   53*         HH=U4*PIN/RIN+PP*PIN/U1/RIN
00247   54*         DHSTAG=1.-HH/(HIN+U0**2./2.)
00250   55*         DAM=S(M)*(1.-NU(N))
00251   56*         TT=T(N,M)
00252   57*         IF(N.EQ.NC)CF=PI12/(0.5*GAMMA*ACH**2.)
00254   58*         IF(N.EQ.NC)CH=U2/((HIN+U0**2.-HH)/FIN*RIN)/SQRT(GAMMA)/ACH
00256   59*         IF(N.NE.NC)WRITE(6,102)M,PP,TT,U1,U2,U3,U4,DUM,DAM,DHSTAG
00273   60*         IF(N.EQ.NC)WRITE(6,102)M,PP,TT,U1,U2,U3,U4,DUM,DAM,CF,CH
00311   61*         WRITE(6,117)(DISS(I),I=1,NSPEC),HSUM
00320   62*      50 CONTINUE
00320   63*    C
00323   64*         IF(K.EQ.KA)WRITE(21)U,UN,F,T,A,S,SM,ST,STN,SX1
00376   65*         IF(K.EQ.KA) END FILE 21
00400   66*         RETURN
00401   67*         END
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00401      68*      C
00401      69*      C

      END OF COMPILATION:        NO  DIAGNOSTICS.
      OUTPUT          SYMBOLIC                29 NOV 72  11:40:01   0  01574010    14     69  (DELETED)
      OUTPUT  CODE    RELOCATABLE             29 NOV 72  11:40:01   1  01575716   106      1  (DELETED)
                                                                     0  01576072    14     47
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```
@ FOR,* LGRNGE,LGRNGL                                                    18 DEC 72          0:19:47.949
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A  -(EXEC8 LEVEL E120(CO10A)
THIS COMPILATION WAS DONE ON 18 DEC 72 AT 00:19:48

    SUBROUTINE LGRNGE    ENTRY POINT 000246

    STORAGE USED: CODE(I) 00027C; DATA(D) 000056; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   INTERP 000120

    EXTERNAL REFERENCES (BLOCK, NAME)

    0004   ALOG
    0005   EXP
    0006   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001  000010 11L      0001  000020 12L      0001  000026 122G     0001  000052 135G     0001  000037 14L
    0001  000153 147G     0001  000161 152G     0001  000041 51L      0000 R 000013 A       0003 R 000121 ANSR
    0000 R 000012 ANSWR   0000 R 000005 B1      0000 R 000006 B2      0000 R 000007 B3      0000 R 000010 B4
    0000 I 000003 I       0000  000026 INJP$    0000 I 000011 J       0000 I 000002 JA      0000 I 000001 K
    0000 I 000000 NX      0000 I 000004 MXI     0003 I 000120 NTP     0000 R 000013 XX      0000 R 000014 X0
    0000 R 000015 X1      0000 R 000016 X2      0000 R 000017 X3      0003 R 000024 Y       0000 R 000020 Y0
    0000 R 000021 Y1      0000 R 000022 Y2      0000 R 000023 Y3      0003 R 000000 Z

00101    1*          SUBROUTINE LGRNGE(TT)                                          LGRN  1
00101    2*      C                                                                  LGRN  2
00103    3*          COMMON /INTERP/ Z(20),Y(20,3),NTP,ANSR(3)
00103    4*      C                                                                  LGRN  4
00104    5*          DIMENSION A(10)                                                LGRN  5
00104    6*      C                                                                  LGRN  6
00105    7*          EQUIVALENCE (XX,A(1)),(X0,A(2)),(X1,A(3)),(X2,A(4)),(X3,A(5)), LGRN  7
00105    8*         1(Y0,A(6)),(Y1,A(7)),(Y2,A(8)),(Y3,A(9))                        LGRN  8
00105    9*      C                                                                  LGRN  9
00106   10*          IF(TT-Z(2))10,10,11                                            LGRN 10
00111   11*       10 NX=1                                                           LGRN 11
00112   12*          GO TO 51                                                       LGRN 12
00113   13*       11 IF(TT-Z(NTP-1)) 12,12,13                                       LGRN 13
00116   14*       13 NX=NTP-3                                                       LGRN 14
00117   15*          GO TO 51                                                       LGRN 15
00120   16*       12 K=NTP-1                                                        LGRN 16
00121   17*          DO 14 JA=2,K                                                   LGRN 17
00124   18*          IF(TT-Z(JA))15,15,14                                           LGRN 18
00127   19*       15 NX=JA-2                                                        LGRN 19
00130   20*          GO TO 51                                                       LGRN 20
00131   21*       14 CONTINUE                                                       LGRN 21
00133   22*       51 XX=ALOG(TT+1.0)                                                LGRN 22
00134   23*          DO 23 I=1,4                                                    LGRN 23
```

```
00137    24*          MXI=MX+I-1                                                    LGRN  24
00140    25*       23 A(I+1)=ALOG(Z(MXI)+1.D)                                       LGRN  25
00142    26*          B1=((XX-X1)*(XX-X2)*(XX-X3))/(XD-X1)/(XD-X2)/(XD-X3)          LGRN  26
00143    27*          B2=((XX-XD)*(XX-X2)*(XX-X3))/(X1-XD)/(X1-X2)/(X1-X3)          LGRN  27
00144    28*          B3=((XX-XD)*(XX-X1)*(XX-X3))/(X2-XD)/(X2-X1)/(X2-X3)          LGRN  28
00145    29*          B4=((XX-XD)*(XX-X1)*(XX-X2))/(X3-XD)/(X3-X1)/(X3-X2)          LGRN  29
00146    30*          DO 8 J=1,3                                                    LGRN  30
00151    31*          DO 3 I=1,4                                                    LGRN  31
00154    32*          MXI=MX+I-1                                                    LGRN  32
00155    33*        3 A(I+5)=ALOG(Y(MXI,J)+1.D)                                     LGRN  33
00157    34*          ANSWR=B1*Y0+B2*Y1+B3*Y2+B4*Y3                                 LGRN  34
00160    35*        8 ANSR(J)=EXP(ABSWR)-1.D                                        LGRN  35
00162    36*          RETURN                                                        LGRN  36
00163    37*          END                                                           LGRN  37
00163    38*    C
00163    39*    C

      END OF COMPILATION:        NO  DIAGNOSTICS.
LGRNGE              SYMBOLIC          29 NOV 72  11:40:03   0  01577314   14   39  (DELETED)
LGRNGE  CODE        RELOCATABLE       29 NOV 72  11:40:03   1  01600356   24    1  (DELETED)
                                                           0  01600406   14   20
```

```
@ AQT CUR                                                                    18 DEC 72                    0:19:49.779
  1.  DEL TRANSP/CODE                                                                                     0:19:50.178
TRANSP   CODE     RELOCATABLE                 16 DEC 72  00:19:37   1  01721406    53     1   (DELETED)
                                                                     0  01716042    14   126
  2.  DEL ACHEM/CODE                                                                                      0:19:50.182
ACHEM    CODE     RELOCATABLE                 19 OCT 72  05:09:36   1  01454572    24     1   (DELETED)
                                                                     0  01454622    14    21
  3.  DEL SAMAR/CODE                                                                                      0:19:50.186
SAMAR    CODE     RELOCATABLE                 19 OCT 72  05:10:05   1  01463540    24     1   (DELETED)
                                                                     0  01463570    14    17

    END CUR LCC 1102-0039 L9
```

REACTING VISCOUS SHOCK LAYER SOLUTION AT ZERO FLOW INCIDENCE
PROGRAM G132

FLOWFIELD CALCULATION FOR ORBITER NOSE OF 2 FT AT TRAJECTORY POINT 4

RUN NUMBER 12 ON 6/22/72
LB= 1 LE= 1

MA= 5 NA= 20 KA= 100 JA= 20 BETA= .00

GAMMA= .1400000+01 STAB= .5000000+00

RE= .45000+03 PR= .71000+00 LEWIS= .15000+01 RN= .20000+01 TW= .10000+02

ZO= .0000 YO= .0000 XIMAX= .1000+01 ANGLE= .00000

UG=.2600+05 PIN=.2118-02 HIN=.1790+07 RIN=.4141-08 TIN=.2980+03 EIN=.1279+07 ACH=.3073+02

EPS 1 TO 7
.100000-03 .100000-01 .100000+00

* DIVIDE CHECK AT 014427
* DIVIDE CHECK AT 014437
* DIVIDE CHECK AT 014427
* DIVIDE CHECK AT 014437
* DIVIDE CHECK AT 014427
* DIVIDE CHECK AT 014437
* DIVIDE CHECK AT 014427
* DIVIDE CHECK AT 014437
* DIVIDE CHECK AT 014427
* DIVIDE CHECK AT 014437

FROZEN SIMPLE ISOTHE CATALY

```
    150.000  7250.000 44000.000
N                    .1401+02  .0000     .0000
   .29560066+01   .72396636-04  -.19303650-08   .65164957-14  -.65710982-21
   .52645241+05  -.35782222+00   .24773161+01   .82901024-04  -.76068977-07
   .22462058-10  -.15404079-14   .56132605+05   .39987642+01
NO                   .3001+02  .0000     .0000
   .44678467+01   .22095846-04  -.14024959-09   .16591832-14   .63494057-22
   .86956016+04  -.19150373+01   .31967976+01   .11768965-02  -.38778399-06
   .55730992-10  -.28806146-14   .98652406+04   .61134104+01
N2                   .2802+02  .7670+00 -.2072+04
   .44517496+01   .21995996-04  -.20501717-09   .24035750-14   .82543275-22
  -.23783613+04  -.36415174+01   .32066185+01   .96095003-03  -.26764111-06
   .33487659-10  -.15439933-14  -.99993079+03   .44601651+01
0                    .1600+02  .0000     .0000
   .25760267+01   .22026986-04   .50533473-10  -.11757918-13  -.13900519-20
   .28602301+05   .44633487+01   .26847763+01  -.24357548-03   .96464480-07
  -.13270647-10   .65179101-15   .29176733+05   .41135781+01
02                   .3200+02  .2330+00 -.2075+04
   .44763073+01   .33173559-04  -.11257496-09   .13687415-14   .68543405-22
  -.20125496+04  -.18259916+01   .32206321+01   .13129468-02  -.46651373-06
   .70960134-10  -.38179530-14  -.10142978+04   .59381147+01
NO+                  .3001+02  .0000     .0000
   .44517063+01   .23790900-04  -.20057345-09   .23327397-14   .73175507-22
   .11669996+06  -.28547776+01   .32070007+01   .95463964-03  -.26312343-06
   .32660308-10  -.14945999-14   .11608876+06   .52543095+01
E-                   .5200-03  .0000    -.1481+04
   .25000000+01   .00000000     .0000000     .00000000     .00000000
  -.74537452+03  -.12427286+02   .25000000+01   .00000000     .00000000
   .00000000     .00000000     -.74537496+03  -.12427286+02
LAST                 .0000     .0000     .0000
```

U	02		14	1	•0
1000.0000	6.7760	1.1690	1.1310		
1500.0000	6.0930	1.1750	1.1370		
2000.0000	7.6240	1.1790	1.1410		
2500.0000	7.2690	1.1820	1.1440		
3000.0000	6.9650	1.1850	1.1470		
3500.0000	6.7490	1.1880	1.1490		
4000.0000	6.5480	1.1900	1.1520		
4500.0000	6.3740	1.1920	1.1540		
5000.0000	6.2190	1.1940	1.1560		
6000.0000	5.9560	1.1970	1.1590		
7000.0000	5.7390	1.2000	1.1620		
8000.0000	5.5530	1.2020	1.1640		
9000.0000	5.3920	1.2050	1.1670		
10000.0000	5.2500	1.2070	1.1690		
N2	0		14	1	•0
1000.0000	10.6100	1.1970	1.1590		
1500.0000	9.6100	1.2050	1.1670		
2000.0000	8.9260	1.2110	1.1730		
2500.0000	8.4060	1.2150	1.1780		
3000.0000	7.9980	1.2190	1.1820		
3500.0000	7.6590	1.2230	1.1860		
4000.0000	7.3740	1.2260	1.1890		
4500.0000	7.1260	1.2290	1.1930		
5000.0000	6.8990	1.2310	1.1950		
6000.0000	6.5350	1.2360	1.2010		
7000.0000	6.2260	1.2400	1.2050		
8000.0000	5.9710	1.2440	1.2090		
9000.0000	5.7440	1.2470	1.2130		
10000.0000	5.5480	1.2500	1.2170		
N2	N2		20	1	2•0
200.0000	15.4310	1.0860	1.1050		
250.0000	14.4350	1.0870	1.0930		
300.0000	13.7780	1.0870	1.0870		
350.0000	13.3040	1.0890	1.0800		
400.0000	12.9450	1.0910	1.0830		
500.0000	12.4210	1.0950	1.0890		
700.0000	11.7670	1.1010	1.0950		
1000.0000	11.1700	1.1100	1.0960		
1500.0000	10.5400	1.1260	1.1070		
2000.0000	10.0100	1.1390	1.1150		
2500.0000	9.5200	1.1470	1.1200		
3000.0000	9.0710	1.1560	1.1250		
3500.0000	8.6970	1.1670	1.1300		
4000.0000	8.3500	1.1700	1.1330		
5000.0000	7.8040	1.1830	1.1420		
6000.0000	7.3940	1.1950	1.1470		
7000.0000	7.0350	1.2000	1.1520		
8000.0000	6.7210	1.2010	1.1550		
9000.0000	6.4740	1.2050	1.1580		
10000.0000	6.2790	1.2080	1.1580		
N2	02		20	1	•0
200.0000	14.9790	1.0900	1.1200		
250.0000	13.9180	1.0870	1.0990		
300.0000	13.2150	1.0870	1.0910		
350.0000	12.7160	1.0870	1.0870		
400.0000	12.3370	1.0890	1.0800		

500.0000	11.7960	1.0920	1.0660
600.0000	11.4210	1.0970	1.0500
800.0000	10.8500	1.1100	1.0990
1000.0000	10.4600	1.1320	1.1130
1500.0000	10.0500	1.1540	1.1260
2000.0000	9.8020	1.1710	1.1400
2500.0000	9.5980	1.1800	1.1510
3000.0000	9.4120	1.1930	1.1550
4000.0000	9.0400	1.2050	1.1690
5000.0000	8.7660	1.2120	1.1760
6000.0000	8.4840	1.2170	1.1800
7000.0000	8.2320	1.2210	1.1840
8000.0000	7.9910	1.2240	1.1880
9000.0000	7.7240	1.2270	1.1910
10000.0000	7.4880	1.2300	1.1940
02	02	20	1 2.0
200.0000	14.6960	1.0920	1.1420
250.0000	13.5130	1.0890	1.1090
300.0000	12.7630	1.0870	1.0960
350.0000	12.2310	1.0870	1.0900
400.0000	11.8340	1.0870	1.0870
500.0000	11.2710	1.0900	1.0820
600.0000	10.8840	1.0930	1.0870
800.0000	10.2900	1.1020	1.0930
1000.0000	9.8960	1.1150	1.0990
1500.0000	9.4700	1.1300	1.1090
2000.0000	9.2260	1.1470	1.1170
2500.0000	9.0200	1.1550	1.1240
3000.0000	8.8400	1.1620	1.1280
4000.0000	8.5160	1.1700	1.1340
5000.0000	8.2460	1.1760	1.1390
6000.0000	7.9630	1.1800	1.1430
7000.0000	7.7020	1.1840	1.1450
8000.0000	7.4790	1.1860	1.1470
9000.0000	7.2650	1.1880	1.1490
10000.0000	7.1140	1.1900	1.1510
N	N	14	1 .0
1000.0000	7.0390	1.1290	1.1440
1500.0000	6.2920	1.1340	1.1440
2000.0000	5.8120	1.1380	1.1440
2500.0000	5.4640	1.1420	1.1430
3000.0000	5.1930	1.1440	1.1430
3500.0000	4.9720	1.1470	1.1420
4000.0000	4.7860	1.1490	1.1410
4500.0000	4.6260	1.1510	1.1410
5000.0000	4.4860	1.1520	1.1410
6000.0000	4.2540	1.1550	1.1420
7000.0000	4.0620	1.1580	1.1410
8000.0000	3.9020	1.1600	1.1410
9000.0000	3.7640	1.1620	1.1410
10000.0000	3.6430	1.1630	1.1410
N	N0	10	1 .0
1000.0000	9.4370	1.2040	1.1660
1500.0000	8.5030	1.2120	1.1740
2000.0000	7.8690	1.2180	1.1810
2500.0000	7.3930	1.2230	1.1860
3000.0000	7.0150	1.2270	1.1910
4000.0000	6.4390	1.2340	1.1990

5000.0000	6.0060	1.2400	1.2050
6000.0000	5.6670	1.2450	1.2110
7000.0000	5.3860	1.2490	1.2160
8000.0000	5.1480	1.2530	1.2210

N NZ 14 1 .0

1000.0000	9.8240	1.1960	1.1570
1500.0000	8.8970	1.2030	1.1650
2000.0000	8.2720	1.2090	1.1710
2500.0000	7.8020	1.2140	1.1760
3000.0000	7.4270	1.2180	1.1800
3500.0000	7.1150	1.2210	1.1840
4000.0000	6.8500	1.2240	1.1870
4500.0000	6.6220	1.2270	1.1900
5000.0000	6.4190	1.2290	1.1930
6000.0000	6.0600	1.2340	1.1980
7000.0000	5.7990	1.2380	1.2030
8000.0000	5.5580	1.2410	1.2070
9000.0000	5.3550	1.2450	1.2100
10000.0000	5.1700	1.2470	1.2140

N 0 14 1 .0

1000.0000	8.4180	1.1760	1.1920
1500.0000	7.2270	1.1770	1.1840
2000.0000	6.4940	1.1770	1.1780
2500.0000	5.9840	1.1760	1.1580
3000.0000	5.6060	1.1760	1.1380
3500.0000	5.3100	1.1720	1.1270
4000.0000	5.0750	1.1680	1.1260
4500.0000	4.8990	1.1690	1.1260
5000.0000	4.7450	1.1700	1.1290
6000.0000	4.4900	1.1730	1.1290
7000.0000	4.2820	1.1750	1.1330
8000.0000	4.1080	1.1770	1.1340
9000.0000	3.9590	1.1780	1.1350
10000.0000	3.8290	1.1800	1.1370

NO NO 17 1 2.0

200.0000	15.1540	1.0950	1.1320
250.0000	13.9740	1.0940	1.1150
300.0000	13.1920	1.0940	1.1050
350.0000	12.6300	1.0950	1.1010
400.0000	12.2030	1.0960	1.0960
500.0000	11.5930	1.0990	1.0940
600.0000	11.1770	1.1010	1.0930
700.0000	10.8620	1.1030	1.0900
800.0000	10.6080	1.1050	1.0920
1000.0000	10.2210	1.1080	1.0900
1200.0000	9.9410	1.1100	1.0950
1500.0000	9.6130	1.1130	1.0970
2000.0000	9.2080	1.1170	1.0960
2500.0000	8.9070	1.1200	1.0950
3000.0000	8.6700	1.1220	1.0950
4000.0000	8.3110	1.1250	1.0950
5000.0000	8.0460	1.1280	1.0950

NO 0 13 1 .0

500.0000	6.5610	1.2130	1.1750
1000.0000	5.3960	1.2290	1.1920
1500.0000	4.7710	1.2390	1.2040
2000.0000	4.3500	1.2470	1.2130
2500.0000	4.0370	1.2530	1.2210

3000.0000	3.7890	1.2580	1.2270
4000.0000	3.4130	1.2670	1.2360
5000.0000	3.1350	1.2750	1.2470
6000.0000	2.9160	1.2810	1.2560
7000.0000	2.7370	1.2860	1.2630
8000.0000	2.5860	1.2910	1.2690
9000.0000	2.4570	1.2960	1.2760
10000.0000	2.3440	1.3000	1.2810
0	0	14	1 .0
1000.0000	7.1820	1.1600	1.1410
1500.0000	6.5640	1.1630	1.1560
2000.0000	6.1390	1.1650	1.1600
2500.0000	5.8210	1.1690	1.1630
3000.0000	5.5670	1.1730	1.1680
3500.0000	5.3550	1.1770	1.1720
4000.0000	5.1740	1.1800	1.1800
4500.0000	5.0160	1.1820	1.1840
5000.0000	4.8760	1.1840	1.1850
6000.0000	4.6400	1.1880	1.1820
7000.0000	4.4380	1.1910	1.1820
8000.0000	4.2710	1.1950	1.1820
9000.0000	4.1180	1.1960	1.1810
10000.0000	3.9960	1.1980	1.1810
LAST		0 0	.0

TABLES OF TRANSPORT AND RELAXATION DATA ARE FILLED

2.	0.	1.	0.	0.
0.	2.	1.	0.	1.
0.	0.	0.	2.	1.
0.	0.	0.	0.	0.
0.				

CHEMICAL REACTIONS FROM REF 19

$K = A \cdot EXP(-B/T) \cdot T^{N}$

(UNITS - CC/MOLE/SEC)

	REACTIONS CONSIDERED	A	B	N	REACTION TYPE
1	N2 +N + = N +N +N	.41000+23	.11300+06	-.15000+01	3
2	N2 +NO + = N +N +NO	.19000+18	.11300+06	-.50000+00	3
3	N2 +N2 + = N +N +N2	.48000+18	.11300+06	-.50000+00	3
4	N2 +O + = N +N +O	.19000+18	.11300+06	-.50000+00	3
5	N2 +O2 + = N +N +O2	.19000+18	.11300+06	-.50000+00	3
6	NO +N + = N +O +N	.79000+22	.75500+05	-.15000+01	3
7	NO +NO + = N +O +NO	.79000+22	.75500+05	-.15000+01	3
8	NO +N2 + = N +O +N2	.39000+21	.75500+05	-.15000+01	3
9	NO +O + = N +O +O	.79000+22	.75500+05	-.15000+01	3
10	NO +O2 + = N +O +O2	.39000+21	.75000+05	-.15000+01	3
11	NO +O + = O2 +N +	.32000+10	.19700+05	.10000+01	1
12	N2 +O + = NO +N +	.70000+14	.38000+05	.00000	1
13	N2 +O2 + = NO +NO +	.46000+25	.64000+05	-.25000+01	1
14	O2 +N + = O +O +N	.36000+20	.59500+05	-.10000+01	3
15	O2 +NO + = O +O +NO	.36000+20	.59500+05	-.10000+01	3
16	O2 +N2 + = O +O +N2	.48000+21	.59500+05	-.15000+01	3
17	O2 +O + = O +O +O	.64000+24	.59500+05	-.20000+01	3
18	O2 +O2 + = O +O +O2	.19000+22	.59500+05	-.15000+01	3
19	N +O + = NO+ +E- +	.65000+12	.31900+05	.00000	1

	SPECIES	INIT. MOLE FRACTION	MOL. WT.	TEMPERATURE COEFFICIENTS(0-8000 DEGREES KELVIN)						
				B(I,1)	B(I,2)	B(I,3)	B(I,4)	B(I,5)	B(I,6)	B(I,7)
1	N	.000	14.00800	.2477316+01	.6290162-04	-.7606898-07	.2246204-10	-.1540408-14	.5613260+05	.3998764+01
2	NO	.000	30.00800	.3196798+01	.1176897-02	-.3877840-06	.5573099-10	-.2880615-14	.9865241+04	.6113410+01
3	N2	.767+00	28.01600	.3206618+01	.9609500-03	-.2676411-06	.3348790-10	-.1543993-14	-.9999308+03	.4460165+01
4	O	.000	16.00000	.2684776+01	-.2435755-03	.9646448-07	-.1327065-10	.6517910-15	.2917673+05	.4113578+01
5	O2	.233+00	32.00000	.3220632+01	.1312947-02	-.4665137-06	.7096013-10	-.3817953-14	-.1014298+04	.5938115+01

6	NO+	.000	30.00800	.3207001+01	.9546396-03	-.2631234-06	.3266031-10	-.1494600-14	.1180888+06	.5254309+01
7	E-	.000	.00052	.2500000+01	.0000000	.0000000	.0000000	.0000000	-.7453750+03	-.1242729+02

TEMPERATURE COEFFICIENTS(8000-30000DEGREES KELVIN)

	A(I,1)	A(I,2)	A(I,3)	A(I,4)	A(I,5)	A(I,6)	A(I,7)
	.2958509+01	.7239664-04	-.1930365-08	.6516496-14	-.8571098-21	.5284524+05	-.3578222+00
	.4467649+01	.2269585-04	-.1462496-09	.1659183-14	.6349406-22	.8695602+04	-.1915037+01
	.4451746+01	.2199600-04	-.2050172-09	.2403575-14	.8254327-22	-.2378361+04	-.3641517+01
	.2575027+01	.2202699-04	.5053347-10	-.1175792-13	-.1390052-20	.2869230+05	.4463349+01
	.4476307+01	.3317356-04	-.1125750-09	.1368742-14	.6854340-22	-.2012525+04	-.1825992+01
	.4451706+01	.2379090-04	-.2005735+09	.2332740-14	.7317551-22	.1167000+06	-.2854778+01
	.2500000+01	.0000000	.0000000	.0000000	.0000000	-.7453749+03	-.1242729+02

REACTION TYPES

A + B = C + D	1
A + B + (M) = C + (M)	2
A + B = C + D + E	3
A + B = C	4
A + (M) = B + C + (M)	5
A + B + C = D + E	6

PRODUCT - REACTANT MATRIX

3	1	0	1	1	1
3	2	0	1	1	2
3	3	0	1	1	3
3	4	0	1	1	4
3	5	0	1	1	5
2	1	0	1	4	1
2	2	0	1	4	2
2	3	0	1	4	3
2	4	0	1	4	4
2	5	0	1	4	5
2	4	0	5	1	0
3	4	0	2	1	0
3	5	0	2	2	0
5	1	0	4	4	1
5	2	0	4	4	2
5	3	0	4	4	3
5	4	0	4	4	4
5	5	0	4	4	5
1	4	0	6	7	0

.00
.00
-2072.00
.00
-2075.00
.00
-1481.25

N=	X1=	ZB=	YB=	ZBY=	CURV=
2	.0000	1.000	.00000	1.57080	1.000
3	.2000	.980	.20000	1.36944	1.000
4	.4000	.918	.39596	1.16368	1.000
5	.6000	.815	.57961	.95254	1.000
6	.8000	.670	.74259	.73387	1.000
7	1.0000	.481	.87654	.50217	1.000
2	1.0000				
3	1.0000				
4	1.0000				
5	1.0000				
6	1.0000				
7	1.0000				
8	1.0000				
9	1.0000				
10	1.0000				
11	1.0000				
12	1.0000				
13	1.0000				
14	1.0000				
15	1.0000				
16	1.0000				
17	1.0000				
18	1.0000				
19	1.0000				
20	1.0000				
21	1.0000				
22	1.0000				

AT STEP 0 DT1= .0000000 DT2= .0000000 AT N= 0, M= 0
TIME= .0000000

	Y	SHOCK VELOCITY	SY	ZS	YS
2	.00000	.00000	.00000	.00000	.00000
3	.40000+03	.00000	.00000	.00000	.00000
4	.45000+03	.00000	.00000	.00000	.00000
5	.60000+00	.00000	.00000	.00000	.00000
6	.60000+03	.00000	.00000	.00000	.00000
7	.10000+01	.00000	.00000	.00000	.00000

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.60000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.67143+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.74286+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.81429+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.88571+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.95714+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.57000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.63786+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.70571+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.77357+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.84143+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.90929+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.54000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.60429+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.66857+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.73286+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.79714+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.86143+00	.2980-07

	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 5

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.51000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.57071+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.63143+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.69214+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.75286+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.81357+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 6

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.48000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.53714+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.59429+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.65143+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.70857+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.76571+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 7

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.45000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.50357+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.55714+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.61071+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.66429+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.71786+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.42000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.47000+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.52000+00	.5960-07

	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.57000+00	.4470-07	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.62000+00	.5960-07	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.67000+00	.2980-07	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.39000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.43643+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.48286+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.52929+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.57571+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.62214+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.36000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.40286+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.44571+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.48857+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.53143+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.57429+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.33000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.36929+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.40857+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.44786+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.48714+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.52643+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 12

P	T	RHO	U	V	E	M	Z	DHSTAG

	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.30000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.33571+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.37143+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.40714+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.44286+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.47857+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.27000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.30214+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.33429+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.36643+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.39857+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.43071+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.24000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.26857+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.29714+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.32571+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.35429+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.38286+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.21000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.23500+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.26000+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.28500+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.31000+00	.5960-07

	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
7	.10000+01	.10000+01	.10000+01	.31668+02	-.17499+02	.66339+03	.30727+02	.33500+00	.2980-07	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.18000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.20143+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.22286+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.24429+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.26571+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31668+02	-.17499+02	.66339+03	.30727+02	.28714+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 17

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.15000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.16786+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.18571+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.20357+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.22143+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31668+02	-.17499+02	.66339+03	.30727+02	.23929+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 18

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.12000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.13429+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.14857+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.16286+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.17714+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31668+02	-.17499+02	.66339+03	.30727+02	.19143+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 19

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.90000-01	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.10071+00	.5960-07

	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.11143+00	.5960-07	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.12214+00	.4470-07	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.13286+00	.5960-07	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.14357+00	.2980-07	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		

AT LINE 20

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.60000-01	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.67143-01	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.74286-01	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.81429-01	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.88571-01	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.95714-01	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 21

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.30000-01	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.33571-01	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.37143-01	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.40714-01	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.44286-01	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.47857-01	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 22

	P	T	RHO	U	V	E	M	Z	CF	CH
	N	NO	N2	O	O2	NO+	E-			
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.89407-08	.2201-11	.0000
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
3	.10000+01	.10000+01	.10000+01	.72713+01	-.35622+02	.66339+03	.30727+02	.10005-07	.2190-03	.2175-09
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.11069-07	-.3840-04	-.1087-09
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.12134-07	-.9645-04	-.2175-10
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.13198-07	-.2086-03	.8362-17
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.14263-07	-.1534-03	.1935-17
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		

STEP 0, TIME= .2664-03, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .1000+01
2.66385-04 2.66385-07

* CHAR UN/FLOW AT 025716

* CHAR UN/FLOW AT 025716

* CHAR UN/FLOW AT 025716

* CHAR UN/FLOW AT 025716

* CHAR UN/FLOW AT 025716

* CHAR UN/FLOW AT 025716

* CHAR UN/FLOW AT 025716

* CHAR UN/FLOW AT 025716

* CHAR UN/FLOW AT 025716

STEP 1, TIME= .5119-03, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .1335+02
2.45540-04 0.00000

STEP 2, TIME= .7570-03, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .2279+02
2.45087-04 2.45087-04

STEP 3, TIME= .1004-02, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .3284+02
2.47025-04 2.47025-04

STEP 4, TIME= .1254-02, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .4343+02
2.49907-04 2.49907-04

STEP 5, TIME= .1507-02, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .5449+02
2.53382-04 2.53382-04

STEP 6, TIME= .1765-02, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .6596+02
2.57231-04 2.57231-04

STEP 7, TIME= .2026-02, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .7781+02
2.61296-04 2.61296-04

STEP 8, TIME= .2290-02, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .9001+02
2.63958-04 2.63958-04

STEP 9, TIME= .2549-02, STANDOFF DISTANCE= .6000+00
WMAX= .0000 , WMIN= .0000 , WRANGE= .0000 , MAXIM PRESS= .1025+03

AT STEP 100 DTI= .1430371-02 DTZ= .1430371-02 AT N= 12, M= 2
TIME= .2552502-01

	Y	SHOCK VELOCITY	SY	ZS	YS
2	.00000	.00000	.00000	.00000	.00000
3	.23000+00	.00000	.00000	.00000	.00000
4	.46000+00	.00000	.00000	.00000	.00000
5	.69000+00	.00000	.00000	.00000	.00000
6	.80000+00	.00000	.00000	.00000	.00000
7	.10000+01	.00000	.00000	.00000	.00000

AT LINE 2

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.10000+01	.10000+01	.10000+01	.36069-07	-.36356+02	.66339+03	.30727+02	.60000+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72713-01	-.35622+02	.66339+03	.30727+02	.67143+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14396+02	-.33385+02	.66339+03	.30727+02	.74286+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.21073+02	-.29627+02	.66339+03	.30727+02	.81429+00	.4470-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10000+01	.10000+01	.10000+01	.26998+02	-.24350+02	.66339+03	.30727+02	.88571+00	.5960-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31868+02	-.17499+02	.66339+03	.30727+02	.95714+00	.2980-07
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 3

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.15673+01	.15673+01	.10000+01	.00000	-.36272+02	.66134+03	.25807+02	.57000+00	.2236-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72528+01	-.35626+02	.66310+03	.32811+02	.63786+00	.4466-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10223+01	.10223+01	.10000+01	.14266+02	-.33409+02	.66213+03	.32003+02	.70571+00	.1862-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10602+01	.10602+01	.10000+01	.20944+02	-.29659+02	.66154+03	.31410+02	.77357+00	.2707-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.26709+01	.26708+01	.10000+01	.26903+02	-.24248+02	.66186+03	.19740+02	.84143+00	-.2059-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31972+02	-.19649+02	.66214+03	.77454+01	.90929+00	.1893-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 4

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.19600+01	.19600+01	.10000+01	.00000	-.36178+02	.65885+03	.23018+02	.54000+00	.5399-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72397+01	-.35633+02	.66289+03	.36041+02	.60429+00	.7610-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14138+02	-.33438+02	.66099+03	.34250+02	.66857+00	.3619-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.20808+02	-.29703+02	.65968+03	.33685+02	.73286+00	.5582-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.41967+01	.41966+01	.10000+01	.26788+02	-.24152+02	.65991+03	.15683+02	.79714+00	.4377-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31875+02	-.19431+02	.66009+03	.82369+01	.86143+00	.4966-02

	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 5

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.23844+01	.23844+01	.13000+01	.00000	-.36081+02	.65627+03	.20813+02	.51000+00	.8640-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72316+01	-.35644+02	.66277+03	.41329+02	.57071+00	.9347-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.14012+02	-.33472+02	.65997+03	.38176+02	.63143+00	.5146-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.20664+02	-.29754+02	.65756+03	.40726+02	.69214+00	.8787-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.49803+01	.49803+01	.10000+01	.26654+02	-.24082+02	.65824+03	.13289+02	.75286+00	.1767-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31751+02	-.19256+02	.65882+03	.89652+01	.81357+00	.6883-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 6

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.28364+01	.28364+01	.10000+01	.00000	-.35977+02	.65357+03	.19028+02	.48000+00	.1203-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72282+01	-.35658+02	.66275+03	.52235+02	.53714+00	.9686-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.13687+02	-.33513+02	.65911+03	.45676+02	.59429+00	.6444-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.20522+02	-.29814+02	.65537+03	.81885+02	.65143+00	.1208-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.61954+01	.61954+01	.10000+01	.26512+02	-.24010+02	.65627+03	.11732+02	.70857+00	.2898-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31697+02	-.19072+02	.65704+03	.99991+01	.76571+00	.9556-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 7

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.33195+01	.33195+01	.10000+01	.00000	-.35867+02	.65070+03	.17535+02	.45000+00	.1562-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10000+01	.10000+01	.10000+01	.72314+01	-.35675+02	.66281+03	.85384+02	.50357+00	.8730-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.13764+02	-.33561+02	.65846+03	.64978+02	.55714+00	.7429-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.20367+02	-.29886+02	.65293+03	.46940+02	.61071+00	.1575-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.72966+01	.72966+01	.10000+01	.26355+02	-.23950+02	.65402+03	.10661+02	.66429+00	.4634-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31449+02	-.18900+02	.65494+03	.11496+02	.71786+00	.1272-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	

AT LINE 8

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.38432+01	.38432+01	.10000+01	.00000	-.35749+02	.64764+03	.16243+02	.42000+00	.1943-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10002+01	.10000+01	.10002+01	.72382+01	-.35693+02	.66290+03	.90536+02	.47000+00	.7371-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.13648+02	-.33618+02	.65806+03	.13312+03	.52000+00	.8000-02

	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
5	.10000+01	.10000+01	.10000+01	.20209+02	-.29971+02	.65040+03	.28183+02	.57000+00	.1956-01	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
6	.63172+01	.63172+01	.10000+01	.26185+02	-.23903+02	.65158+03	.98598+01	.62000+00	.6762-02	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		
7	.10000+01	.10000+01	.10000+01	.31268+02	-.18741+02	.65259+03	.14145+02	.67000+00	.1626-01	
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02		

AT LINE 9

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.43459+01	.43459+01	.10000+01	.00000	-.35622+02	.64424+03	.15220+02	.39000+00	.2379-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10003+01	.10000+01	.10003+01	.72536+01	-.35710+02	.66308+03	.53055+02	.43643+00	.4703-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10030+01	.10000+01	.10030+01	.13534+02	-.33682+02	.65797+03	.52605+02	.48286+00	.8162-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.20053+02	-.30069+02	.64786+03	.21053+02	.52929+00	.2339-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.92431+01	.92431+01	.10000+01	.26004+02	-.23870+02	.64902+03	.92468+01	.57571+00	.9225-02
	.73440-11	.15734-10	.76700+00	.83894-11	.23300+00	.15733-10	.27264-15	.28853+02	
7	.10000+01	.10000+01	.10000+01	.31067+02	-.18597+02	.65001+03	.20647+02	.62214+00	.2014-01
	.13592-10	.29120-10	.76700+00	.15527-10	.23300+00	.29119-10	.50459-15	.28853+02	

AT LINE 10

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.43839+01	.43839+01	.10000+01	.00000	-.35491+02	.64118+03	.14074+02	.36000+00	.2835-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
3	.10012+01	.10000+01	.10012+01	.72696+01	-.35726+02	.66312+03	.40036+02	.40286+00	.4116-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.13427+02	-.33755+02	.65817+03	.37485+02	.44571+00	.7863-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.19894+02	-.30182+02	.64518+03	.16877+02	.48857+00	.2742-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10049+02	.10049+02	.10000+01	.25813+02	-.23854+02	.64628+03	.87793+01	.53143+00	.1213-01
	.71770-10	.15379-09	.76700+00	.81996-10	.23300+00	.15377-09	.26646-14	.28853+02	
7	.10000+01	.10000+01	.10000+01	.30849+02	-.18470+02	.64723+03	.52725+02	.57429+00	.2433-01
	.13283-09	.28462-09	.76700+00	.15176-09	.23300+00	.28458-09	.49315-14	.28853+02	

AT LINE 11

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.49587+01	.49569+01	.10000+01	.00000	-.35339+02	.63740+03	.13106+02	.33000+00	.3316-01
	.00000	.00000	.76980+00	.00000	.23020+00	.00000	.00000	.28843+02	
3	.10014+01	.10000+01	.10014+01	.72997+01	-.35741+02	.66344+03	.35126+02	.36929+00	-.6637-04
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10030+01	.10000+01	.10030+01	.13326+02	-.33837+02	.65880+03	.30918+02	.40857+00	.6916-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.19745+02	-.30310+02	.64273+03	.14220+02	.44786+00	.3111-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.10741+02	.10741+02	.10000+01	.25618+02	-.23855+02	.64355+03	.84181+01	.48714+00	.1521-01
	.28192-10	.60402-10	.76700+00	.32206-10	.23300+00	.60397-10	.10466-14	.28853+02	
7	.31202+01	.31202+01	.10000+01	.30614+02	-.18363+02	.64424+03	.18002+02	.52643+00	.2564-01
	.52177-10	.11179-09	.76700+00	.59606-10	.23300+00	.11178-09	.19370-14	.28853+02	

AT LINE 12

	P	T	RHO	U	V	E	M	Z	DHSTAG

	N	NO	N2	O	O2	NO+	E-		
2	.55990+01	.56010+01	.10000+01	.00000	-.35173+02	.63340+03	.12201+02	.30000+00	.3822-01
	.35739-12	.77740-12	.76426+00	.41542-12	.23574+00	.77740-12	.13570-16	.28863+02	
3	.10033+01	.10000+01	.10033+01	.73201+01	-.35750+02	.66321+03	.30206+02	.33571+00	.2709-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.13232+02	-.33932+02	.65977+03	.26155+02	.37143+00	.5457-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.19569+02	-.30458+02	.64000+03	.12211+02	.40714+00	.3521-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.11243+02	.11243+02	.10000+01	.25403+02	-.23678+02	.64027+03	.81680+01	.44286+00	.1939-01
	.00000	.00000	.76699+00	.00000	.23301+00	.00000	.00000	.28853+02	
7	.49205+01	.49205+01	.10000+01	.30350+02	-.18280+02	.64050+03	.13194+02	.47857+00	.2856-01
	.00000	.00000	.76699+00	.00000	.23301+00	.00000	.00000	.28853+02	

AT LINE 13

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.62159+01	.62100+01	.10000+01	.00000	-.34983+02	.62854+03	.11456+02	.27000+00	.4461-01
	.00000	.00000	.77377+00	.00000	.22623+00	.00000	.00000	.28828+02	
3	.10025+01	.10000+01	.10025+01	.73799+01	-.35774+02	.66403+03	.27744+02	.30214+00	-.9552-03
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10000+01	.10000+01	.10000+01	.13151+02	-.34031+02	.66137+03	.23938+02	.33429+00	.3042-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.19466+02	-.30625+02	.63801+03	.10740+02	.36643+00	.3821-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.11570+02	.11570+02	.10000+01	.25195+02	-.23927+02	.63726+03	.80079+01	.39857+00	.2343-01
	.10571-09	.22647-09	.76702+00	.12075-09	.23298+00	.22728-09	.39266-14	.28853+02	
7	.67956+01	.67955+01	.10000+01	.30069+02	-.18228+02	.63661+03	.10955+02	.43071+00	.3158-01
	.19564-09	.41914-09	.76704+00	.22348-09	.23296+00	.42065-09	.72672-14	.28853+02	

AT LINE 14

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.69885+01	.69960+01	.10000+01	.00000	-.34784+02	.62397+03	.10666+02	.24000+00	.5032-01
	.88435-12	.19049-11	.75862+00	.10069-11	.24138+00	.19049-11	.32861-16	.28884+02	
3	.10078+01	.10000+01	.10078+01	.73628+01	-.35734+02	.66251+03	.27199+02	.26857+00	.1325-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10025+01	.10000+01	.10025+01	.13040+02	-.34091+02	.66188+03	.23720+02	.29714+00	.2278-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.19327+02	-.30797+02	.63579+03	.96789+01	.32571+00	.4155-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.11731+02	.11731+02	.10000+01	.24983+02	-.23987+02	.63392+03	.79192+01	.35429+00	.2821-01
	.15406-09	.33037-09	.76692+00	.17621-09	.23308+00	.32876-09	.57184-14	.28853+02	
7	.82773+01	.82774+01	.10000+01	.29794+02	-.18194+02	.63233+03	.97350+01	.38286+00	.3580-01
	.28516-09	.61144-09	.76684+00	.32612-09	.23316+00	.60646-09	.10583-13	.28854+02	

AT LINE 15

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.77794+01	.77668+01	.10000+01	.00000	-.34534+02	.61771+03	.99773+01	.21000+00	.5856-01
	.00000	.00000	.77971+00	.00000	.22029+00	.00000	.00000	.28806+02	
3	.10022+01	.10000+01	.10022+01	.75223+01	-.35878+02	.66630+03	.20670+02	.23500+00	-.4378-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10044+01	.10000+01	.10044+01	.13007+02	-.34249+02	.66577+03	.21248+02	.26000+00	-.3575-02
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.19228+02	-.31052+02	.63320+03	.83979+01	.28500+00	.4545-01
	.00000	.00000	.76700+00	.00000	.23300+00	.00000	.00000	.28853+02	
6	.11473+02	.11473+02	.10000+01	.24753+02	-.24121+02	.63056+03	.80040+01	.31000+00	.3363-01

	.00000	.00000	.76732+03	.00000	.23265+00	.00000	.00000	.28852+02		
7	.13013+02	.13012+02	.10006+01	.29454+02	-.18225+02	.62835+03	.66700+01	.33500+00	.3918-01	
	.00000	.00000	.76759+03	.00000	.23241+00	.00000	.00000	.28851+02		

AT LINE 16

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.93276+01	.76534+01	.13000+01	.00000	-.34210+02	.61052+03	.90751+01	.18000+00	.6749-01
	.00000	.00000	.74477+03	.00000	.25523+00	.00000	.00000	.28935+02	
3	.13128+01	.13000+01	.13128+01	.74678+01	-.35496+02	.65759+03	.12078+03	.20143+00	.6740-02
	.00000	.00000	.76700+03	.00000	.23300+00	.00000	.00000	.28853+02	
4	.13082+01	.13000+01	.13082+01	.12640+02	-.34095+02	.66312+03	.65893+02	.22286+00	.4137-03
	.00000	.00000	.76700+03	.00000	.23300+00	.00000	.00000	.28853+02	
5	.13000+01	.13000+01	.13000+01	.19163+02	-.31137+02	.63630+03	.86283+01	.24429+00	.4078-01
	.00000	.00000	.76700+03	.00000	.23300+00	.00000	.00000	.28853+02	
6	.11689+02	.11691+02	.13000+01	.24032+02	-.24157+02	.62916+03	.79045+01	.26571+00	.3543-01
	.16779-09	.36236-09	.76598+03	.19446-09	.23402+00	.32742-09	.61954-14	.28857+02	
7	.99653+01	.99677+01	.10000+01	.29283+02	-.18220+02	.62309+03	.86556+01	.28714+00	.4717-01
	.31059-09	.67064-09	.76511+00	.35989-09	.23489+00	.60597-09	.11466-13	.28860+02	

AT LINE 17

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.95708+01	.95266+01	.10042+01	.00000	-.34243+02	.61004+03	.93871+01	.15000+00	.6897-01
	.28771-13	.00000	.77492+00	.00000	.22506+00	.60285-13	.00000	.28824+02	
3	.10091+01	.10000+01	.10091+01	.78390+01	-.36447+02	.67626+03	.11537+02	.16786+00	-.1937-01
	.00000	.00000	.76700+03	.00000	.23300+00	.00000	.00000	.28853+02	
4	.10200+01	.10000+01	.10200+01	.12886+02	-.34772+02	.67415+03	.13535+02	.18571+00	-.1619-01
	.00000	.00000	.76700+03	.00000	.23300+00	.00000	.00000	.28853+02	
5	.10000+01	.10000+01	.10000+01	.19540+02	-.31802+02	.62282+03	.61850+01	.20357+00	.6107-01
	.00000	.00000	.76700+03	.00000	.23300+00	.00000	.00000	.28853+02	
6	.93015+01	.92986+01	.10000+01	.24340+02	-.24560+02	.62402+03	.90264+01	.22143+00	.4677-01
	.35299-10	.65094-10	.76943+03	.79210-10	.23057+00	.10542-09	.13163-14	.28844+02	
7	.13365+02	.13367+02	.10000+01	.28850+02	-.18396+02	.62505+03	.72619+01	.23929+00	.3911-01
	.65330-10	.12195-09	.77149+00	.54075-10	.22851+00	.19510-09	.24399-14	.28836+02	

AT LINE 18

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.19096+02	.19049+02	.10000+01	.00000	-.31688+02	.56153+03	.54910+01	.12000+00	.1261+00
	.65032-11	.00000	.78644+00	.00000	.21356+00	.10739-10	.25129-15	.28781+02	
3	.12119+02	.12198+02	.10000+01	.72796+01	-.33710+02	.63027+03	.77261+01	.13429+00	.3313-01
	.00000	.00000	.71290+00	.00000	.28710+00	.00000	.00000	.29055+02	
4	.11547+02	.11577+02	.10000+01	.12638+02	-.32869+02	.65364+03	.81189+01	.14857+00	-.1197-02
	.28279-10	.62032-10	.74703+00	.29652-10	.25300+00	.12872-10	.99934-15	.28927+02	
5	.13000+01	.13000+01	.10000+01	.18981+02	-.30783+02	.65048+03	.25961+02	.16286+00	.1943-01
	.00000	.00000	.76700+03	.00000	.23300+00	.00000	.00000	.28853+02	
6	.16323+02	.15908+02	.10265+01	.24033+02	-.23517+02	.61371+03	.64588+01	.17714+00	.5235-01
	.29901-09	.60403-09	.76375+03	.28887-09	.23625+00	.62582-09	.11123-13	.28865+02	
7	.11921+02	.11372+02	.10491+01	.28130+02	-.17624+02	.58390+03	.77278+01	.19143+00	.1041+00
	.54256-09	.10939-08	.76112+00	.52313-09	.23886+00	.11333-08	.20143-13	.28875+02	

AT LINE 19

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	.39045+02	.29468+02	.13337+01	.00000	-.30180+02	.55093+03	.41270+01	.90000-01	.1267+00
	.00000	.00000	.71647+03	.00000	.28353+00	.53075-10	.00000	.29041+02	
3	.33452+02	.23651+02	.14000+01	.75714+01	-.31787+02	.60989+03	.50087+01	.10071+00	.4606-01

	•00000	•00000	•81758•00	•00000	•15242•00	•33207-09	•00000	•28558•02		
4	•12133•02	•92538•01	•13032•01	•11781•02	-•32221•02	•61463•03	•89655•01	•11143•00	•6088-01	
	•00000	•00000	•81433•00	•00000	•18567•00	•87712-10	•00000	•28679•02		
5	•10667•01	•10000•01	•10667•01	•18964•02	-•33334•02	•58034•03	•41157•01	•12214•00	•1250•00	
	•00000	•00000	•76700•00	•00000	•23300•00	•00000	•00000	•28853•02		
6	•23720•02	•21059•02	•11263•01	•24313•02	-•22519•02	•61553•03	•54338•01	•13286•00	•4185-01	
	•00000	•00000	•76736•00	•00000	•23264•00	•00000	•00000	•28852•02		
7	•48443•02	•41155•02	•11770•01	•28438•02	-•14180•02	•64266•03	•36177•01	•14357•00	-•2923-01	
	•00000	•00000	•76763•00	•00000	•23237•00	•00000	•00000	•28851•02		

AT LINE 20

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	•63192•02	•62174•02	•10000•01	•00000	-•66533•01	•23848•03	•60446•00	•60000-01	•5459•00
	•00000	•00000	•89475•00	•00000	•10525•00	•00000	•00000	•28388•02	
3	•13871•03	•14508•03	•10086•01	•58465•01	-•71295•01	•55802•03	•54223•00	•67143-01	-•4809-01
	•00000	•00000	•36020•00	•00000	•63980•00	•00000	•00000	•30441•02	
4	•17288•03	•11065•03	•15795•01	•12088•02	-•13973•02	•56672•03	•12406•01	•74286-01	-•1773•01
	•00000	•00000	•68268•00	•00000	•31732•00	•00000	•00000	•29168•02	
5	•20595•03	•91264•02	•22582•01	•15903•02	-•12037•02	•52413•03	•14779•01	•81429-01	•7384-01
	•79850-03	•10822-02	•73825•00	•22085-02	•25766•00	•22155-06	•74980-10	•28873•02	
6	•29807•03	•85486•02	•34497•01	•19497•02	-•44656•01	•50874•03	•15219•01	•88571-01	•1040•00
	•33541-02	•51709-02	•75861•00	•10075-01	•22275•00	•48180-06	•22428-09	•28504•02	
7	•35029•03	•77268•02	•44542•01	•21048•02	-•12286•01	•50210•03	•16842•01	•95714-01	•1259•00
	•44564-02	•69631-02	•76739•00	•13497-01	•20769•00	•59405-06	•28867-09	•28348•02	

AT LINE 21

	P	T	RHO	U	V	E	M	Z	DHSTAG
	N	NO	N2	O	O2	NO+	E-		
2	•18652•04	•77525•02	•20223•02	•00000	-•40346•01	•36609•03	•28497•00	•30000-01	•3102•00
	•38706-01	•67110-01	•55117•00	•18693•00	•15605•00	•28394-04	•49357-08	•24246•02	
3	•17739•04	•79466•02	•19728•02	•50226•01	-•21623•01	•35587•03	•39576•00	•33571-01	•3290•00
	•32465-01	•55061-01	•66836•00	•11457•00	•12953•00	•13228-04	•31961-08	•25495•02	
4	•13532•04	•88008•02	•12182•02	•72082•01	-•16708•01	•47871•03	•46542•00	•37143-01	•1123•00
	•11164•00	•70164-01	•58370•00	•16862•00	•65592-01	•78416-04	•10759-07	•22847•02	
5	•11018•04	•76199•02	•13090•02	•12909•02	•76319•00	•40028•03	•97111•00	•40714-01	•2708•00
	•28066-01	•44224-01	•71165•00	•84920-01	•13113•00	•10169-04	•27808-08	•26117•02	
6	•71618•03	•74064•02	•89008•01	•15171•02	•19336•01	•41639•03	•11811•01	•44286-01	•2522•00
	•21349-01	•38062-01	•72450•00	•71909-01	•14417•00	•61309-05	•18917-08	•26556•02	
7	•35782•03	•63958•02	•53365•01	•19891•02	•43762•01	•45000•03	•17474•01	•47857-01	•2218•00
	•73321-02	•25203-01	•75132•00	•44756-01	•17139•00	-•22963-05	•36449-10	•27522•02	

AT LINE 22

	P	T	RHO	U	V	E	M	Z	CF	CH
	N	NO	N2	O	O2	NO+	E-			
2	•18479•04	•89223•01	•20711•03	•00000	•00000	•25000•02	•00000	•89487-08	•0000	-•7936-01
	•00000	•00000	•76700•00	•00000	•23300•00	•00000	•00000	•28853•02		
3	•18655•04	•89223•01	•20908•03	•00000	•00000	•25000•02	•00000	•10005-07	-•5392-01	-•4681-01
	•00000	•00000	•76700•00	•00000	•23300•00	•00000	•00000	•28853•02		
4	•18468•04	•89223•01	•18457•03	•00000	•00000	•25000•02	•00000	•11069-07	-•5777-01	-•6219-01
	•00000	•00000	•76700•00	•00000	•23300•00	•00000	•00000	•28853•02		
5	•14024•04	•89223•01	•15718•03	•00000	•00000	•25000•02	•00000	•12134-07	-•1112•00	-•9937-01
	•00000	•00000	•76700•00	•00000	•23300•00	•00000	•00000	•28853•02		
6	•85228•03	•89223•01	•95522•02	•00000	•00000	•25000•02	•00000	•13198-07	-•1177•00	-•4472-01
	•00000	•00000	•76700•00	•00000	•23300•00	•00000	•00000	•28853•02		
7	•38430•03	•89223•01	•43071•02	•00000	•00000	•25000•02	•00000	•14263-07	-•1537•00	-•3414-01
	•00000	•00000	•76700•00	•00000	•23300•00	•00000	•00000	•28853•02		